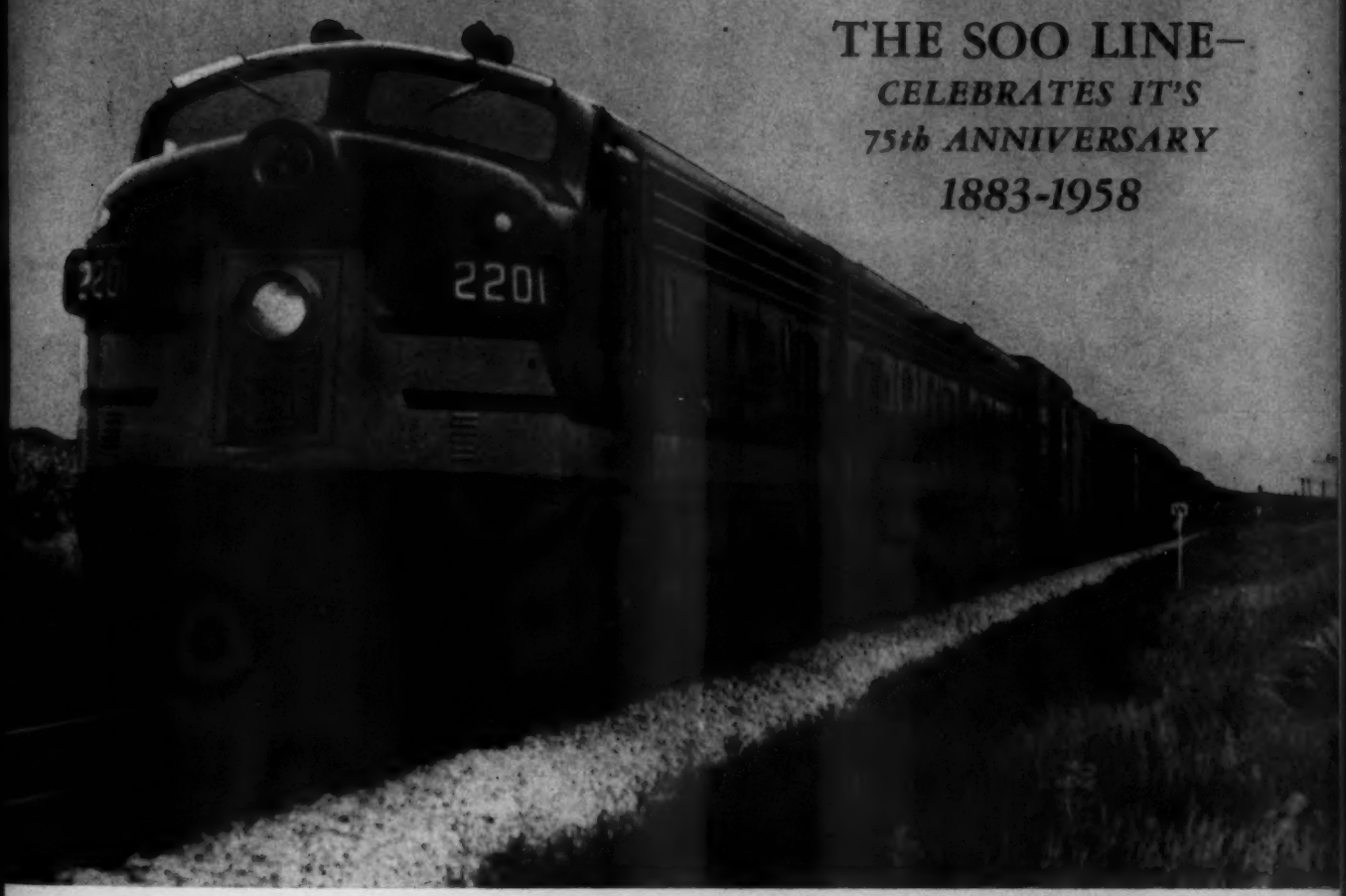
MAY 1958

LWAY TRACK and STRUCTURES

A Simmons-Boardman TIME-SAVER Publication

75th YEAR OF
SAFETY AND SERVICE

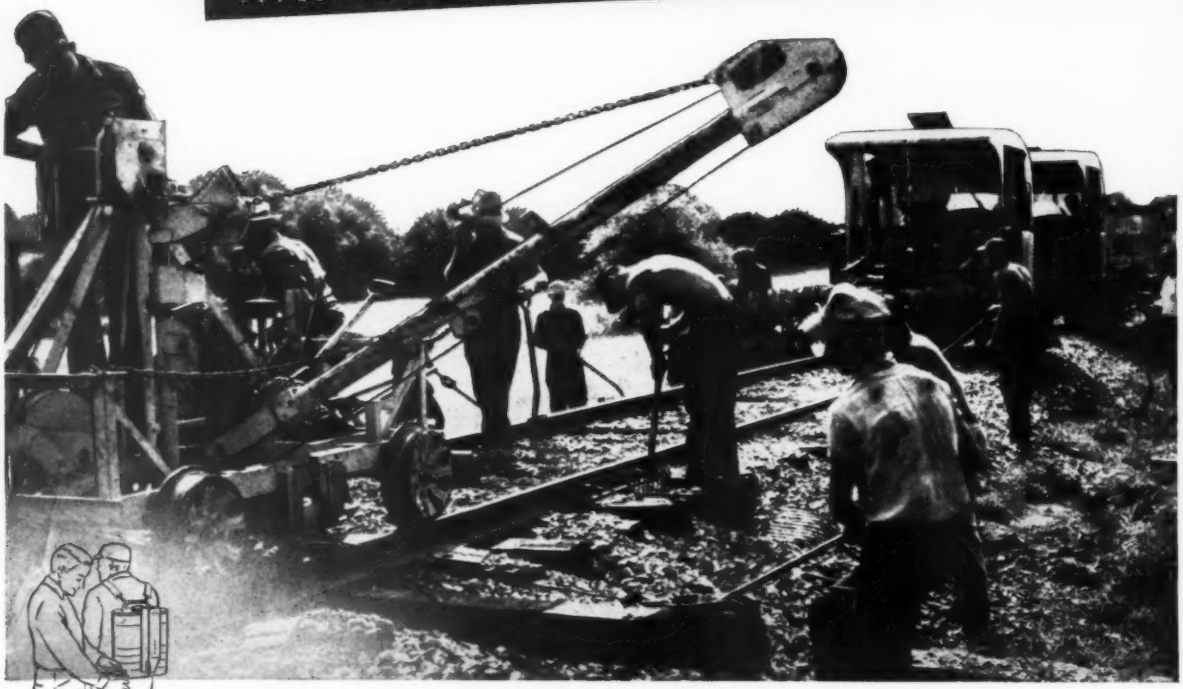


THE SOO LINE—
CELEBRATES IT'S
75th ANNIVERSARY
1883-1958

RAIL JOINT COMPANY
DIVISION OF POOR & COMPANY, INC.
50 CHURCH STREET, NEW YORK 7, N. Y.

AJAX CUPS CAN HELP REDUCE ACCIDENT COSTS . . .

. . . CUT DOWN ABSENTEEISM . . . KEEP WORK ON SCHEDULE . . .



This drinking water service offers
3 BIG ADVANTAGES FOR TRACK MAINTENANCE GANGS

1 Whether to comply with the law — which in some states requires it — or simply to promote good employee relationships, many roads now supply clean fresh drinking water to maintenance gangs, by using AJAX Cups and equipment.

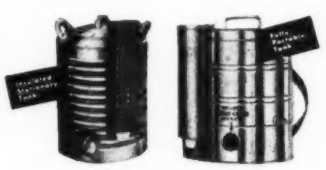
2 Crisp, clean AJAX Cups reduce the hazard of transmitted infections, thus reduce absenteeism, help keep important maintenance work on schedule.

3 Safety-imprinted AJAX Cups aid your accident-prevention program by putting safety messages right in your workers' hands several times daily . . . and safety messages *that get read* do help prevent accidents.

Developed out of long experience with railroad work, AJAX Complete Drinking Water Service is ideally suited to the needs of track maintenance gangs . . . actually works three ways to cut your operating costs.

Write today **for samples of imprinted Ajax Cups and new folder giving complete details on complete drinking water service.**

AJAX® CUPS — wedge-shaped, easy to hold—dispense open, ready to drink from; come in 4, 6 and 7 oz. sizes, imprinted with assorted stock safety messages at no extra cost — or your own message to order.



United States Envelope Company

General Offices: **Springfield 2, Massachusetts** *15 Divisions from Coast to Coast*

Aerial view of a portion of the Reading's vast yard at Port Richmond, Philadelphia. Tracks with slope from upper left (thaw house and load coal) to lower right form ladder track and throat leading to car-dumper.

This yard runs automatically with Bethlehem Model 22 switch stands

You're looking down on the yard which feeds the car-dumper at Reading's Port Richmond yard in Philadelphia. Cars roll by gravity from the thaw house in upper left of photo to the throat at lower right, thence on to the barney which shoves them up to the dumper.

Switching operations through the ladder track and throat are automatic—Bethlehem Model 22 Automatic Switch Stands see to that. Though you can hardly spot them in the photograph, Model 22's preside at each of the turnouts visible here. Virtually every car movement is a run-through, and that's just what the Model 22 is built for.

As the car-wheels hit the switch points, they nudge them toward the new position. A powerful spring mechanism in the switch stand then takes over and completes the movement, holding the points rigidly in the new setting. The target turns to show the proper indication, but the throwing lever remains right where it was.

Facing-point operations can be handled by throwing the lever, just as with any other stand. This interchangeable feature makes the Model 22 railroading's most versatile switch stand. Maintenance consists only of an occasional oiling. A Bethlehem engineer will gladly furnish complete information, and perhaps arrange a demonstration for you. Just drop a line to the address below. Your inquiry will be promptly handled.

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LUDINGTON, MICHIGAN

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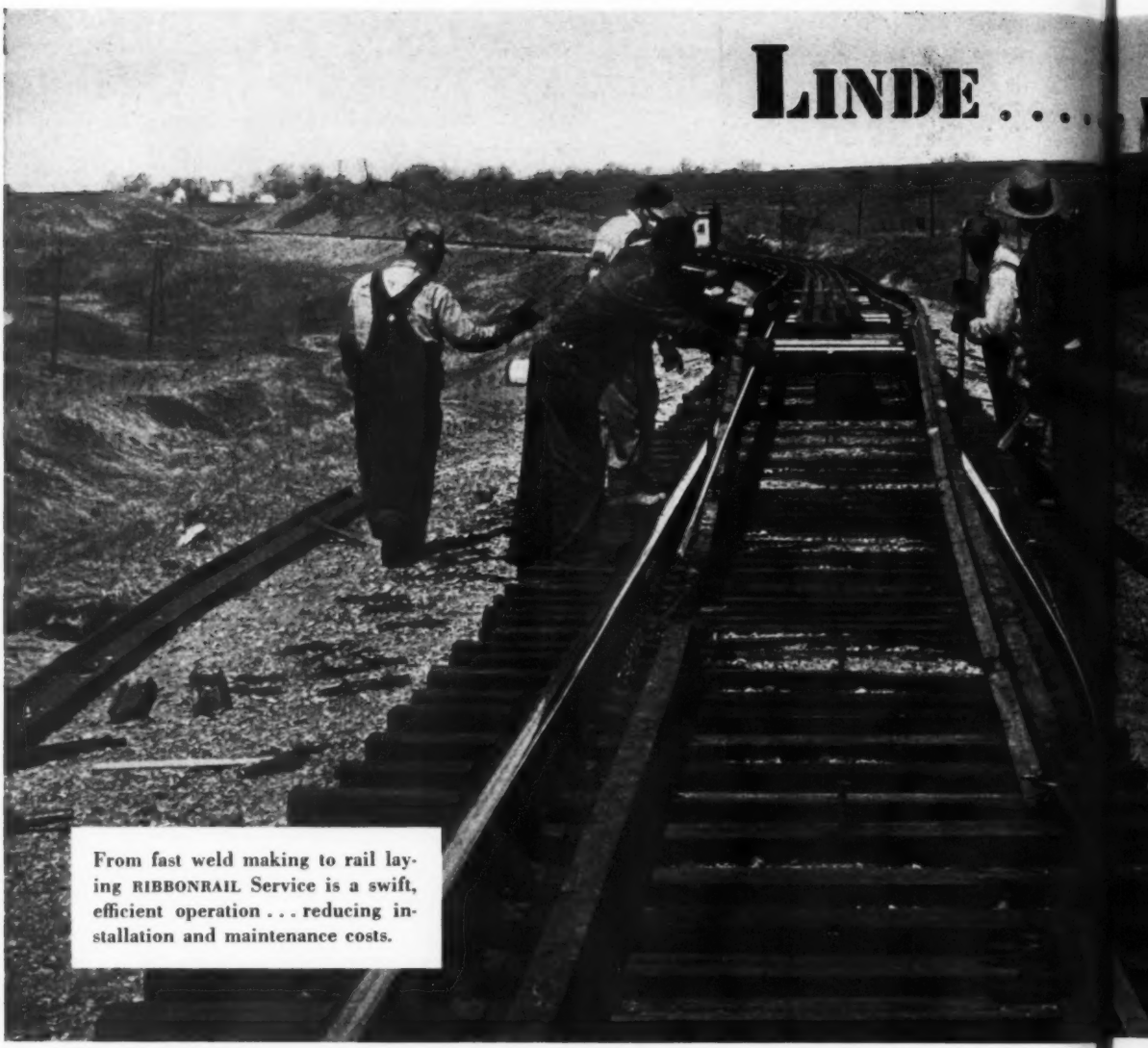
DON'T MISS . . .

What types of tie-renewal organizations are being used under different conditions? What is their consist of machines and men? What production can you expect of them? These questions are answered by F. L. Etchison, chief engineer, Western Maryland.

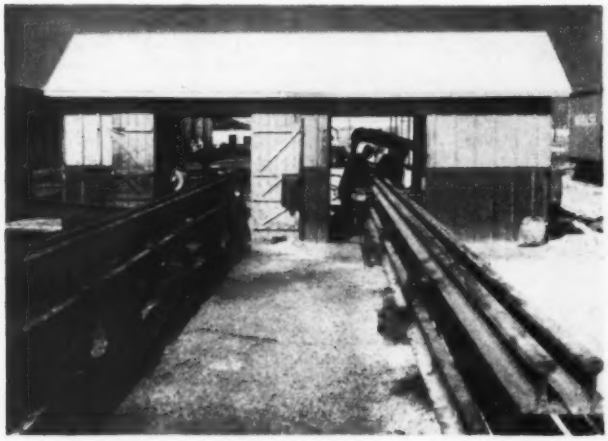
. . . in the June issue

LINDE . . . .

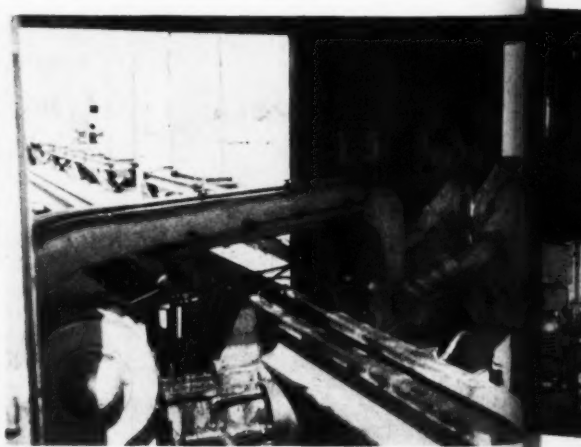


From fast weld making to rail laying RIBBONRAIL Service is a swift, efficient operation . . . reducing installation and maintenance costs.

General view of Wabash's dual rail welding setup. Here a double line of rails enters rail-end preparation shed. ▼



Here, rail ends are cut and cleaned prior to welding. Single saw speeds operation by preparing 4 ends simultaneously. ▼



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HOW WABASH SAVES WITH "RIBBONRAIL" SERVICE

Progressive railroads throughout the nation are reducing track and rolling stock maintenance with LINDE'S RIBBONRAIL Service. The Wabash, for example, started its RIBBONRAIL program in 1948 with a 2-mile test section of 115 lb. continuous welded rail. Maintenance records on this test section proved emphatically the economy of continuous welded rail.

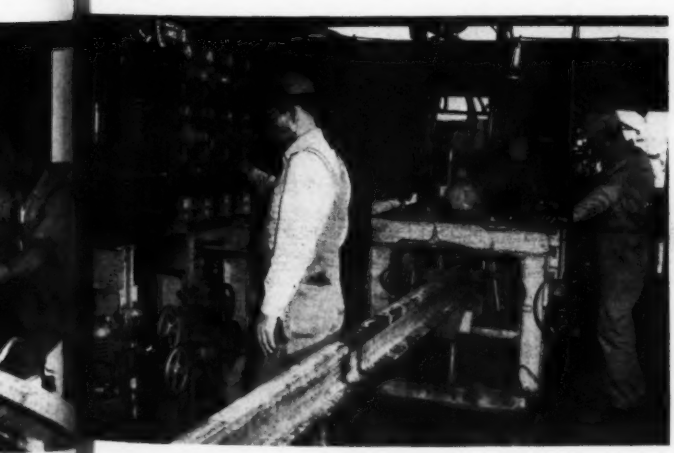
DUAL WELDING SETUP SLASHES COSTS! Today, the Wabash gets even greater efficiency from its RIBBONRAIL program by operating a *dual* welding unit at the Moberly, Missouri rail welding site. The unit consists of a saw for rail end preparation, twin welding and normalizing machines, and grinding equipment. In 1957, it produced 5,860 welds at an average speed of 3.9 minutes per completed weld . . . and reached peak rates as high as one weld every 3 minutes!

The Wabash states that the increased speed and efficiency of the dual setup cut total cost per weld *to as low as $5.47!* This covers costs for all materials and labor—from storage pile to flat car. Material costs alone for bolted joints would have been *double.*

The history of LINDE'S RIBBONRAIL Service is one of greater operating efficiency and lower weld cost. That is why it's the trend in modern railroading . . . and why more and more railroads look to LINDE, leader in continuous rail welding.

Plan your RIBBONRAIL Service Program now. Call your nearby LINDE representative today or write: Railroad Department, LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in principal cities. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

Close-up of twin welding machines where rails are oxy-acetylene pressure-welded at 2250 deg. F. Normalizing, grinding, and weld testing complete the operation. ▼



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STILL THE FAMOUS DUAL PURPOSE PRINCIPLE... one machine does the work of two . . . old ties out, new ties in— **in half the time, half the cost!**

new Improved tie rollers . . . reduce maintenance, improve effectiveness.

new Now self-propelled by bigger and better hydraulic motor. Variable speeds for operating and traveling.

new Large hydraulic-oil reservoir equipped with breather cap, filter and oil-level indicator.

new Electric warning horn.

new Increased hydraulic pump speed and capacity.

new Engine equipped with electric self starter and magneto ignition.

Lease and optional purchase plans available.

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News notes...

. . . a résumé of current events throughout the railroad world

Acting in accordance with the findings of a royal commission the Canadian Pacific announced it will begin eliminating more than 2,400 firemen from road freight and yard diesels on May 11. Indications are that this action will set the stage for a strike of the Brotherhood of Locomotive Firemen & Enginemen. BLF&E President H. E. Gilbert stated that the union is in a financial position to support a strike "as long as the Canadian Pacific would want to tolerate it." The CPR dispute is under close scrutiny by U. S. railroads, but the issue may not be joined here until the current moratorium on contract revisions ends on November 1, 1959.

•

All Canadian railroads, except CPR-Lines West, have been served with a demand for a 25 per cent wage increase by the Brotherhood of Railway Trainmen. The increase would be applicable to miles, hours, overtime, arbitraries and special allowances. The BRT also asked for various work rules changes.

•

Class 1 railroads reported a deficit of $9,000,000, after interest and rentals, in February. This compared with net income of $48,000,000 in February 1957. The AAR's Bureau of Railway Economics also reported that 42 Class 1 roads failed to earn interest and rentals in the first two months of 1958.

•

Carloadings of revenue freight in the second quarter of 1958 may be 10.6 per cent less than in the comparable 1957 period. This estimate has been made by the 13 regional Shippers Advisory Boards in reports to the AAR's Car Service Division. On the basis of the estimate, loadings of the 32 principal commodities will be approximately 6,505,353 cars in the second quarter. This would compare with 7,278,355 cars in the second quarter last year.

•

Prospects for legislation beneficial to the railroads are getting brighter. Agitation for such legislation has resulted from the hearings on the "deterioriating railroad situation" held by the Smathers subcommittee of the Senate Commerce committee. These hearings ended April 3. Specific measures under consideration include these: Repeal or reduction of the excise taxes of 3 per cent on freight transportation and 10 per cent on passenger travel; income-tax relief to ease the financing of new equipment and other facilities; establishment of a railroad emergency loan fund to aid needy railroads; and provisions designed to give the railroads greater freedom in meeting competitive situations and in curtailing or discontinuing unprofitable services.

RAILWAY TRACK and STRUCTURES

News about people

BALTIMORE & OHIO—M. B. Jones, assistant engineer maintenance of way and structures, Eastern region, with headquarters at Baltimore, has retired. Mr. Jones started with the B&O as a rodman in Philadelphia in November 1909, and held various positions on several divisions until November 1919 when he became assistant division engineer at Cumberland, Md. He had held the position of assistant engineer maintenance of way on the Eastern region since May 1, 1937.

BESSEMER & LAKE ERIE—S. W. Sweet, supervisor track, has been appointed roadmaster. **C. W. Morrison,** supervisor track, has been appointed heavy maintenance and equipment engineer, and **B. H. Price, Jr.,** supervisor track, has been appointed construction and contract engineer. **M. A. Haines,** field engineer, has been appointed engineering assistant.

S. D. Barnes, extra assistant supervisor track, has been promoted to supervisor track, with headquarters at Albion, Pa. **Nickolas White,** locomotive crane engineer, has been appointed supervisor track at Grove City, Pa., and **M. A. Thayer,** extra assistant supervisor track, has been promoted to supervisor track, with headquarters at Butler, Pa. **L. E. Fails,** track foreman, has been promoted to assistant supervisor track at Albion, and **Konrad Six,** track foreman, has been promoted to assistant supervisor track at Grove City. **R. C. Johnson,** track laborer, has been promoted to assistant supervisor of track at Butler.

BOSTON & MAINE—John L. Brackett has retired as architect after nearly 52 years of service with the B&M.

FRISCO—E. C. Smith, roadmaster, Chaffee, Mo., has been transfered to Tulsa, Okla., to succeed **C. B. Bonner,** who has retired after more than 51 years of service with the Frisco. **D. F. Holt,** assistant roadmaster at Ft. Scott, Kan., has been promoted to roadmaster at Ft. Worth, Tex., to succeed **B. J. Bishop,** who has been transferred to Chaffee. **C. L. Holdaway,** roadmaster at Kennett, Mo., has been transferred to Chaffee.

GULF, COLORADO & SANTA FE—G. R. Collier, district engineer, Galveston, Tex., has been promoted to chief engineer there, succeeding **W. T. Donoho,** retired. **R. O. Nutt,** division engineer at Galveston, has been promoted to district engineer at Galveston to succeed Mr. Collier, and in turn has been replaced by **T. D. Mason.**

ILLINOIS CENTRAL—Charles H. Mottier, vice-president in charge of engineering, Chicago, and formerly chief engineer, retired on April 30 after 47 years of service with this company.

SOO LINE—Peter R. Dragos, roadmaster, has been promoted to supervisor work equipment, with headquarters at Minneapolis, succeeding **Charles M. Hayes,** retired. Mr. Dragos has served 21 years in the maintenance of way department of the Soo Line, starting on April 21, 1937. In 1941, he entered military service with the U. S. Army where he was attached to an anti-aircraft unit in Japan. He returned to the Soo Line in May 1946 and in August of the following year he became a relief section foreman. During the summer months of the three ensuing years he worked as asistant gang foreman. On May 14, 1950, he was promoted to assistant roadmaster at Stevens Point, Wis. Since November 4, 1953, he had served as roadmaster on the Gladstone division at Ladysmith, Wis.

SOUTHERN—Herbert D. Minnis has been appointed assistant division engineer of the New Orleans & Northeastern (a subsidiary of the Southern), with headquarters at Hattiesburg, Miss.

Ross D. Rothell, assistant track supervisor at Greensboro, N. C., has been promoted to bridge and building supervisor at Princeton, Ind. **Carroll W. Ashby, Jr.,** assistant supervisor at Columbia, S. C., has been promoted to track supervisor at Greenwood, S. C. **Rupert Ward,** assistant track supervisor at Sheffield, Ala., has been advanced to track supervisor at Sylva, N. C.

Mr. Rothell started with the Southern in July, 1927 as a bridge and building laborer. He had been assistant track supervisor at Greensboro since June 1957.

Mr. Ashby is a native of Lynchburg, Va., and entered the service of the Southern as a student apprentice in the office of the chief engineer maintenance of way and structures at Cincinnati, Ohio, in July 1955. He was appointed assistant supervisor in July 1955 and had served in that capacity at Columbia since November 1957.

Mr. Ward entered the service of the Southern in April 1948 as a section laborer on the Atlanta division. He was promoted to relief foreman in May 1950, and had been assistant track supervisor at Sheffield since October 1954.

Obituary

William P. Wiltsee, who retired in May 1948 as chief engineer of the Norfolk & Western, died recently at the age of 79.

Biographical briefs

Glen H. Bond, 57, who was recently promoted to chief scale inspector and supervisor painting on the Chicago, Rock Island & Pacific at Kansas City, Kan. (*RT&S,* Feb., p. 10), studied civil engineering with the International Correspondence Schools. He entered railroad service in 1915 in the car department of the Rock Island at Chickasha, Okla. In 1918 he was promoted to bridge and building carpenter on the Oklahoma Southern division, later serving as bridge and building foreman until 1924 when he was named pile driver engineer. From 1928 until 1934 he served in various capacities in the engineering department and in 1935 was transferred to the signal department at Stratford, Tex. Shortly thereafter he was named track supervisor of the Texas & Oklahoma division. In 1936 he was promoted to engineering construction and masonry inspector at Dalhart, Tex. In 1938 he was named district scale inspector at Des Moines, Iowa—the position he held at the time of his recent promotion.

Lloyd J. Gilmore, 65, who recently retired as general roadmaster on the Great Northern (*RT&S,* Mar., p. 10), attended the University of Minnesota and began railroading in June 1910 as an extra gang timekeeper on the Great Northern at Superior, Wis. In September 1911 he was appointed section and extra gang laborer. From 1913 until 1915 he served in the capacities of assistant extra gang foreman, extra gang foreman and section foreman. In December 1915 he was named assistant roadmaster at Kelly Lake, Minn. From 1917 until 1919 he served on track construction with the 32nd Railway Engineers' American Expeditionary Forces in France. Mr. Gilmore returned to the Great Northern in July 1919 as district roadmaster and was promoted to division roadmaster in 1928 at Superior, Wis. From May 1942 until April 1943, he again served with the U. S. Government as assistant in allocation of track materials for the RFC at Washington, D. C. He resumed his career with the Great Northern in October 1943 as general roadmaster at Spokane, Wash., remaining in this position until his recent retirement.

Chester R. Tinkler, 67, who recently retired as valuation officer of the Southern Pacific (*RT&S,* Feb., p. 10), first entered railway service in 1908 with the Chicago, Burlington & Quincy, serving as an axe-

(*Continued on page* 58)

Charles H. Mottier
IC

Chester R. Tinkler
SP

Why this overwhelming preference for **Borate*** *weed killers*

The answer lies in the dependability of borates to perform satisfactorily, safely, economically in destroying vegetation and preventing regrowth.

As the largest producer of borates in the world, we early recognized their plant-destroying properties. Then, before pioneering the specific use of borates for killing weeds, we did much field work and extensive laboratory research which proved their effectiveness conclusively. Our first weed killer, a sodium borate ore under the trade name of "BORASCU®", went to a major railroad on a trial demonstration basis. Results were extraordinary! Control of vegetation continued up to two years! This borate ore, as a highly effective, easily applied soil sterilant, also offered every desired safety feature by being nonpoisonous, nonflammable, and noncorrosive to ferrous metal. Soon, road after road began using this weed killer successfully and with marked economy. Tests conducted by one major road, about timber trestles on approximately 250 miles of track, showed a cost reduction from $1.48 down to only 19½¢ per lineal foot per year! (A total saving of $28,314.00.) With the acceptance of borates for weed work assured, we began developing other weed killers to meet various requirements. Now, a majority of roads are using one or more of our weed killers in preference to any other.

Today you have a choice of several safe and proven herbicidal borate formulations—each with special characteristics and advantages—to meet *your* particular requirements. We'd like to show you how you can start a labor-saving, dollar-saving weed control program... with borates. May we send a technically trained salesman to recommend and demonstrate the weed killer best suited to your needs?

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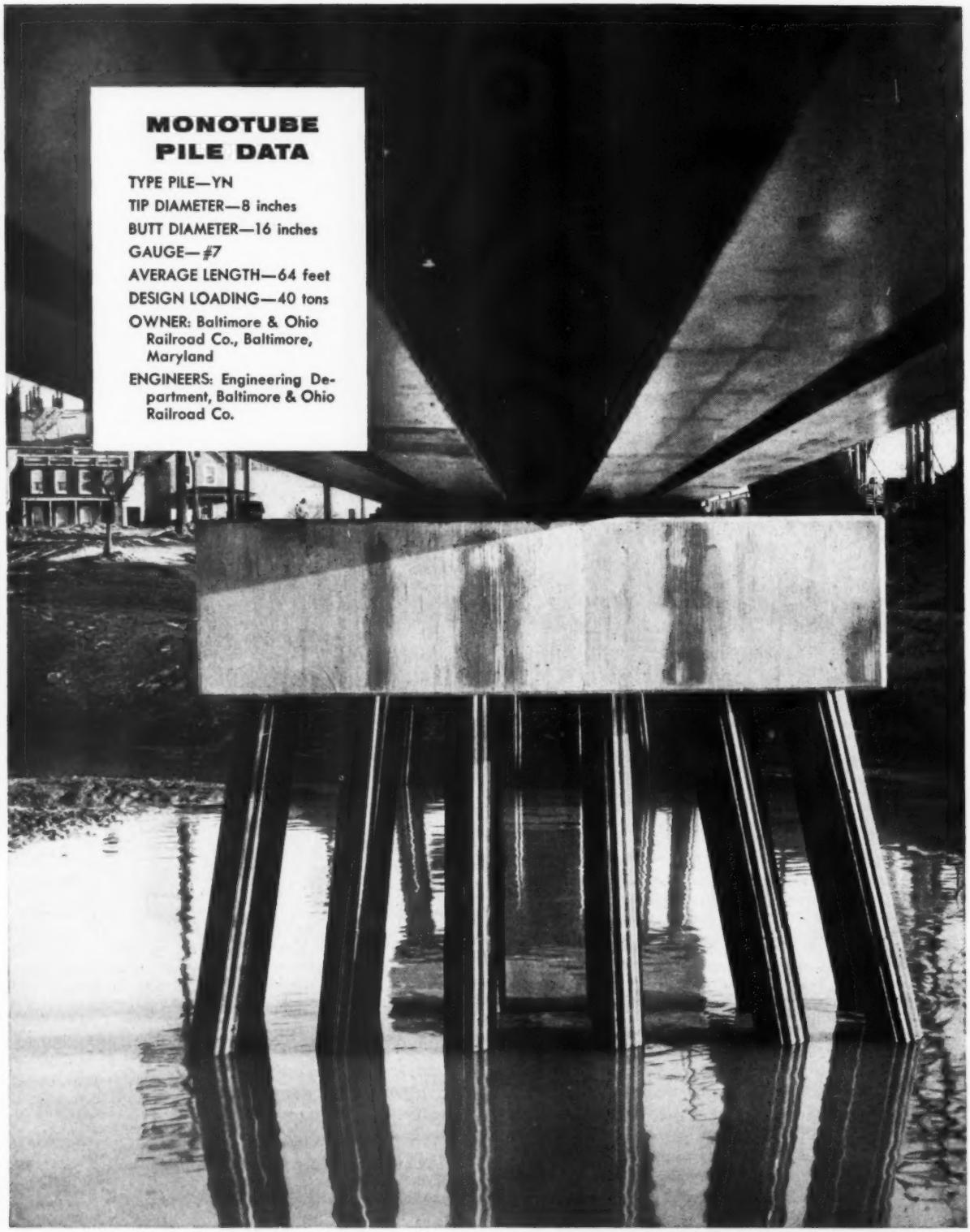
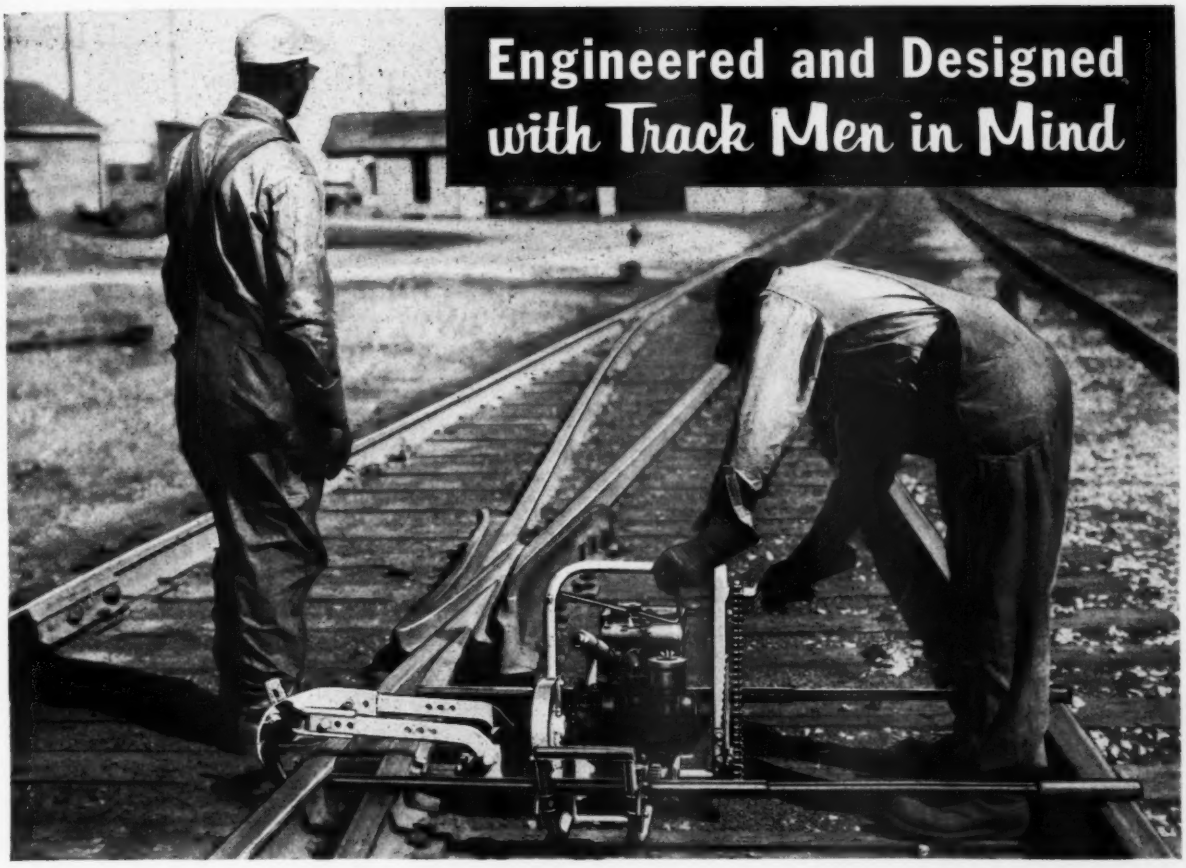


DESIGN ECONOMY plus CONFIDENCE with Monotube piles . . . a sizable saving over conventional pier design, yet complete conformity with railroad specifications. That's the record of these Monotube piles used by the Baltimore & Ohio Railroad at Westport, Maryland.

Tapered, fluted Monotube piles are available in lengths, diameters and gauges to meet every requirement. Write The Union Metal Manufacturing Co., Canton 5, Ohio, for complete information.

UNION METAL

Monotube Foundation Piles



WESTERN FORMERLY BUDA Power Track Drill

Here is a vital piece of equipment in keeping track modernization, expansion and maintenance programs in high gear—the Model P power track drill that has ALL the features essential to economical operation.

EASILY SET UP...and ACCURATE. Can be located from top of rail (with optional telescopic support and locater rods) or positioned on ties and ballast (with long overclutch and adjustable rail guide). No change in set up necessary while working on same size rail.

COMPACT and PORTABLE. Weighs only 130 pounds. Can be started, operated and slid along the rail *by one man.* Easily carried overland by two men.

DEPENDABLE. Gives all-weather, long-life service. Powered by easy-starting 1¾ h.p., 4-cycle Briggs & Stratton air-cooled gas engine. Equipped with Timken roller thrust bearing. Versatile spindle sleeve handles all flat drills from 7/16" to 1 9/16".

SAFE. Can be released and removed from track within 10 seconds . . . no stopping and backing off.

CONTROLLED FEED. Avoids broken and prematurely dulled drills. Sensitive crank-chain mechanism allows operator to vary the thrust accurately according to the hardness of the rail and sharpness of the drill.

FAST. Drills 1⅛" hole in 90 lb. rail in 30 seconds . . . in 155 lb. rail in less than 90 seconds.

HYDUTY-PAULUS MANUAL TRACK DRILL

A track maintainer's tool that every section house should have. Special safety and adjustment features assure precision drilling plus instant emergency detachment.

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IN CANADA: Melville Machinery Co., Ltd., Montreal 3, Quebec

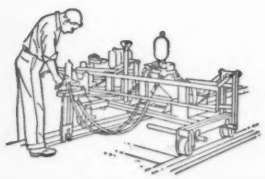
One of a series of ads featuring new WESTERN products formerly supplied by BUDA

A two-man team can remove 50 to 80 ties an hour with . . .

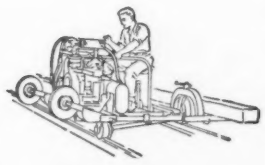
Fairmont

THE FAIRMONT W68 SERIES A HYDRAULIC TIE REMOVER (shown in actual operation at the left) cuts tie renewal and ballast costs to a fraction of what they would be with any other method. The W68 pushes ties out, without jacking track, at the rate of one or better a minute. A light surfacing may be made, but many renewals can be handled without need of track surfacing. The W68 is ideal in small 8- to 10-man gangs and works just as well in large, fully mechanized gangs. When working in traffic, it can be easily removed from the track in two or three minutes. Be sure to reduce your costs by including W68's in your tie renewal plans.

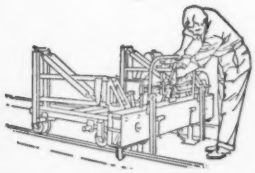
Other Tie Renewal Equipment by Fairmont



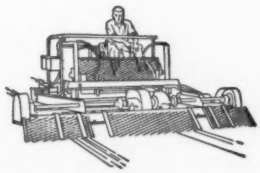
W84 SERIES B HYDRAULIC SPIKE PULLER is primarily for use in tie gangs. Light in weight, it features a ball-and-socket-mounted pull assembly. Will pull from either rail without change-over.



W90 SERIES A TIE HANDLER inserts or removes ties quickly and requires only two men for operation. Simple design and sound construction. Self-propelled. Two-way operation.



W86 SERIES A HYDRAULIC RAIL LIFTER features a spring-counterbalanced lifting arm, welded steel supporting frame and a direct-driven hydraulic pump. Two-man track removal.



W87 SERIES B TIE BED SCARIFIER with one operation can dig a tie bed a minute, to a controlled depth at right angles to rails. Assembly and drive are hydraulically operated.

W83 SERIES B TIE NIPPER (not illustrated) features a simple linkage and lever which guarantee positive opening and closing of hooks. The handle can be placed in three different positions.

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Helps from Manufacturers

The following compilation of literature—including pamphlets and data sheets—is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

MOBILE CRANE. A new two-color four-page bulletin outlining applications of the self-propelled Model CR-35 Bantam mobile crane has been announced. Included are 12 labor-saving materials—handling ideas in the form of actual job reports. They cover such jobs as shipbuilding operations, handling pulpwood, unloading automobiles from rail cars, and stockpiling, sorting and loading of scrap metal and aggregates. (Write: *Schield Bantam Company, Dept. RTS, Waverly, Iowa.*)

TRACKWORK PRODUCTS. A new 124-page catalog, designated G-4, has been made available for showing the complete line of Racor trackwork products. It is pocket size and is divided into two major parts. One part covers frogs, switches, slip switches, crossings of various types, guard rails, manganese switch-point tips, braces, switch rods, switch stands, etc., and contains much useful turnout data and applicable engineering information for heavy-duty trackwork. The other shows comparable information for industrial trackwork. Each section contains descriptions of track specialties suitable for the particular type of trackwork covered. It also describes depth hardening of manganese-steel crossings and surface-hardened rails. Catalog G-4 is well illustrated with both line drawings and photographs. (Write: *Railroad Products Division, American Brake Shoe Company, Dept. RTS, 155 N. Wacker Drive, Chicago 6.*)

DIESEL ENGINES. The two new diesel engines, Models D-344 and D-516, which were recently added to the power line, are described in a 16-page catalog designated BU-413. Photographs, cutaways, charts and other illustrations help explain the operating and performance advantages of the two engines. (Write: *Allis-Chalmers Manufacturing Company, Dept. RTS, Tractor Group, Milwaukee, Wis.*)

PRODUCT LINE. The complete line of Nordberg products is displayed in a recently published 12-page, three-color brochure. It contains a concise description and illustration of each major type machine. The latest types of diesel, Duafuel and spark-ignition gas engines are shown along with the bore, stroke and horsepower of each. Symons crushers and screens are shown in blockout photographs and the principal features and capacities of each are included. Eighteen track-maintenance machines, five of them being recent developments, are shown in operating views. (Write: *Nordberg Manufacturing Company, Dept. RTS, Milwaukee 1, Wis.*)

WEED AND BRUSH KILLERS. Directed solely toward railroad engineers is a new 16-page, four-color booklet which describes seven chemicals designed to control weed and brush. Entitled "Special Report to Railroads," this booklet explains the purpose of each chemical, whether or not they can be combined with another, whether water or oil-borne, and the results which can be expected. On-the-job applications are well depicted in four colors with clear registration and reproduction. (Write: *The Dow Chemical Company, Agricultural Chemical Section, Dept. RTS, Midland, Mich.*)

TRACTORS. Versatility and economy of the Caterpillar D7, D8 and D9 tractors comprise the theme of a new eight-page, two-color booklet recently made available. The publication, entitled "Job Tested for Job Economy," illustrates with photos and job stories the wide range of applications of these tractors. (Write: *Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.*)

ALUMINIZED STEEL. A new two-color, 24-page manual gives detailed information on Aluminized (aluminum-coated) Steel Type 2. Some of the subjects covered are atmospheric-corrosion resistance, mechanical properties of the steel base, resistance to fire damage, and high-heat reflectivity. The booklet also contains sections on available sizes, gages and forms, fabricating and finishing, and storing and handling. Typical uses are illustrated and the results of the atmospheric-exposure tests are shown. (Write: *Armco Drainage & Metal Products, Dept. RTS, Middletown, Ohio.*)

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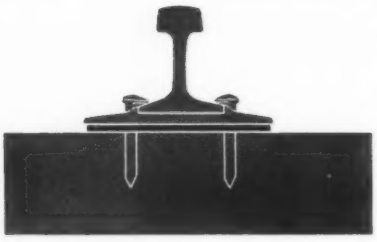

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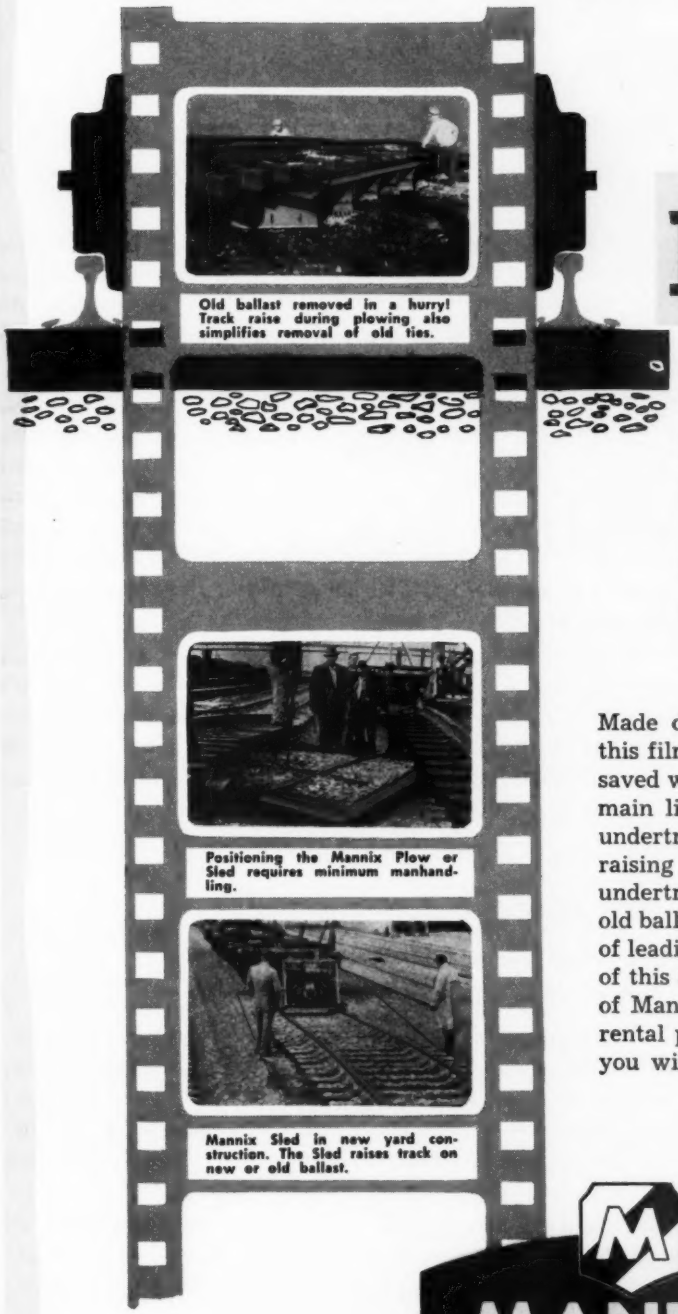

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Mannix Sled in new yard construction. The Sled raises track on new or old ballast.

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Made during actual tracklaying operations, this film tells a story of time and money saved with the Mannix Sled. Now proven for main line and yard use, the Mannix undertrack sled (for laying track or raising on new or old ballast) and Mannix undertrack plow (for disposing of old ballast) are reducing track costs on dozens of leading roads. Arrange for a free showing of this and other films. Ask for full details of Mannix service and the Mannix rental plan. A representative will call if you wish. No obligation.

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Dear reader:

RAILWAY
TRACK and STRUCTURES

On answering management's questions

"Our president has been asking some pointed questions lately," said an engineer maintenance of way recently. "We have given him some answers," he added, "but I don't think he's entirely satisfied yet."

This comment bears on a problem that is constantly before maintenance of way officers, particularly those in the top bracket. M/W officers at headquarters are frequently called upon to answer queries from top management. And local officers come in for their share of questioning during inspection trips over the line.

There are several circumstances that seem to add to the urgency of such questioning. One of these is when there has been a change in top management. A new president—or vice president or general manager—is almost certain to be more inquisitive than his predecessor. It may be that his objective is merely to familiarize himself with the property and the maintenance practices currently in use. On the other hand the motive behind his questioning may be a desire to determine whether the property is being maintained in accordance with the most efficient methods and equipment available.

M/W officers have also learned to expect more persistent questioning from management during periods when business is running below normal, such as at present. This is to be expected. Top officers, under such conditions, are themselves under greater pressure to reduce costs. Not only will they insist on having convincing evidence of the need for proposed expenditures, but in many cases they can be expected to probe more deeply into M/W practices.

Their "whys" can sometimes be very embarrassing.

"Why is our M/W ratio so high?"

"Why are we doing it this way?"

"Why aren't we doing it like 'X' road does?"

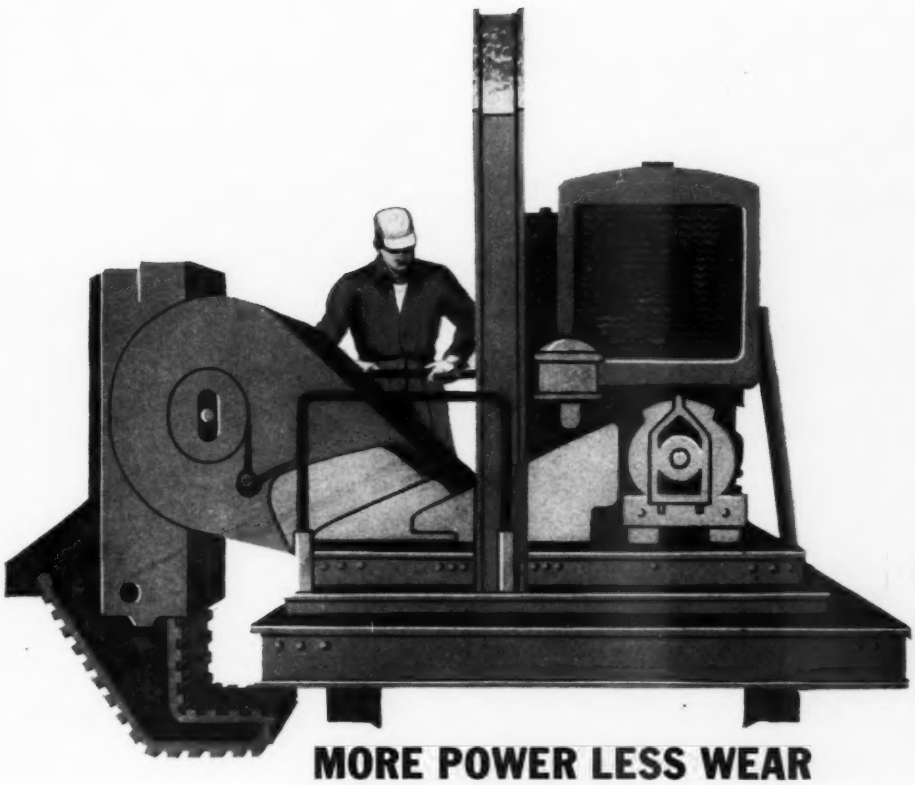
"Why don't we revamp our M/W organization, too?"

Sometimes these questions are not easily answered satisfactorily. This is true particularly if the officer asking them has little understanding of maintenance problems. In that case it may not be easy to convince him that the practices in use on his road are dictated by local conditions. Or perhaps the questioning is based on unrealistic cost figures applying to another road. In that event the matter can be resolved only by analyzing the figures on a realistic basis.

For these reasons it is to be expected that questioning by management will, on occasion, be a source of discomfort to M/W officers. On the other hand, when the matter is viewed objectively, we must admit that such questioning, if it is done in a truly constructive manner, may have a beneficial effect. This is so because it will act as a stimulus for the maintenance man in urging him to greater efforts to keep his own practices abreast of the times.

There is an approach that maintenance men can use in minimizing the possibility of being embarrassed by questions from their superiors. That is by taking the initiative in putting forward projects for improving the performance of their forces. Whoever it was that said a strong offense is the best defense was offering sound advice.

MHD



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WITH LESS COST AND EFFORT

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POWER TRANSMISSION: Hydraulic.

TRAVEL SPEED: 7½ to 15 M.P.H.

TRANSMISSION: 2-speed selective type.

ROTATING DECK: 360°.

TONGS: Rotate 260°.

TONG OPENING RANGE: 5" to 16-½".

BOOM: Box type—15' standard length.

BOOM: 5' intermediate section—optional—Extra charge.

BOOM: Travel—60° with boom parallel to track, 30° in either direction, up or down.

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SWING: 6'2" (measured from center pin).

WHEEL BASE: 60".

OVERALL LENGTH: 10'8".

WEIGHT: Approximately 7000 lbs.

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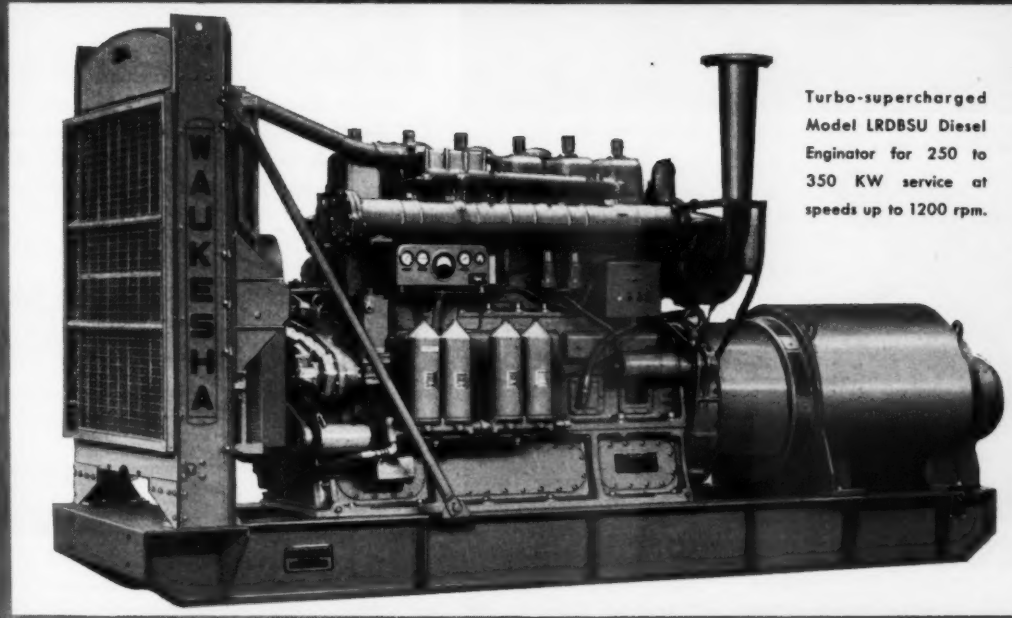

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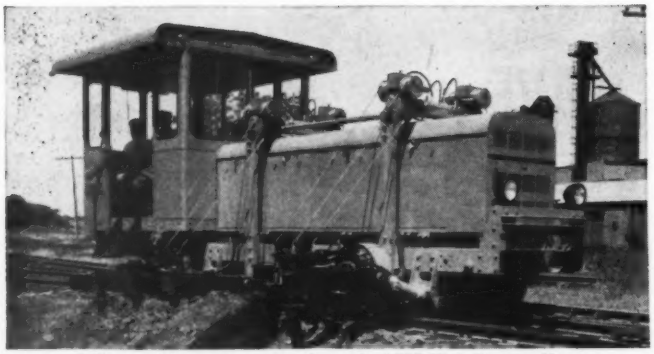

Ballast maintenance car uses Aeroquip 1509 High Pressure Hose Lines on hydraulic attachments, plus 2601 Low Pressure Hose Lines on lube oil and engine fuel lines.

This rail lifter has dependable Aeroquip Flexible Hose Lines on hydraulic track lifting equipment.

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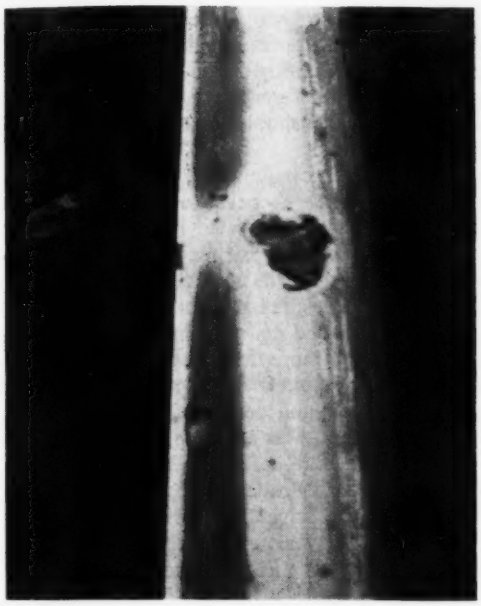
RAILWAY TRACK and STRUCTURES

Engine burns . . .



What railroads are doing about them

Differences of opinion exist on how to handle engine-burned rails. Some roads remove such rails from the track. Others repair them by welding. To bring out this dissimilarity in practice, and perhaps the reasons therefore, this magazine conducted a survey among a large cross-section of Class I roads. The results are presented in this article.

● The question of what to do about rails which have been burned by slipping engine drivers is far from being settled. Some roads remove most of such rails but leave the slightly burned ones in the track. Others remove only the deeply burned rails but repair most of the others by welding.

Why this disparity in thought? Isn't it more economical to weld burns than to change out burned rails? If so, why don't all roads repair such rails by welding?

To find out, *Railway Track & Structures* sent a questionnaire to the chief engineers of 34 Class I roads. Replies were received from 29 roads representing 65 per cent of all mileage operated by Class I roads. Of this number, 7 roads stated that they did not weld engine burns and 22 roads said they did. Among the latter was one road which stated it welded burns in continuous welded rail but not on jointed rail.

Effect of dieselization

Replies received to the questionnaire reveal a wide difference of opinion concerning the effect of dieselization of motive power on the formation of engine burns. Ten roads stated that the operation of diesels results in more burns and 14 declared that fewer burns are now found. Seven roads stated that the burns were shallower and 14 said they were deeper.

Three roads elaborated on this question. The Western Pacific stated that the burns were generally similar in depth, "although in some instances most severe." This road reports it has experienced wheel burns involving destruction of the "majority of the ball area."

The Milwaukee reported that the burns were "deeper account of the smaller diameter driving wheel."

"With diesel power," said the Wabash, "we have fewer driver burns but those that we have are deeper. With steam power, on which drivers are connected, each time the drivers slipped we had as many burns as there were drivers. A diesel engine does not ordinarily spin more than two drivers."

Objections to welding

When a rail is burned by an engine, there are three things which can be done. It can be removed from the track. It can be left in the track with or without the application of joint bars and two bolts. Or it can be welded and left in the track.

However, as stated previously, some roads object to the practice of welding engine burns. One road believed that its welders would not remove all of the thermal cracks before depositing weld metal. Another voiced the same objection and added that the welding of burns was not an economical practice. Another stated that it did not possess the force of competent welders to do such work. Another stated it did not do such work because "our experience seems to indicate that there are no explicit answers to some of the factors involved."

Another road stated that, if the number and severity of the burns make it advisable to remove a rail from the main track, it may be used in a secondary track. But, if it cannot be used there without welding, the rail should be scrapped. Another road declared that it would not weld burned rails unless the work was done only by experienced welders.

A personal interview with a superintendent of welding on a road which does not weld engine burns was more revealing. "A railroad," he said, "will even pay a premium to get control-cooled rail to be sure that it does not produce fissures. Then it turns right around and covers up an area which may contain incipient cracks. If it

Where and why engine burns occur

From the very beginning of railroading, rails have been burned by the slipping of engine drivers. Burns are usually found wherever trains make a standing start, such as at inspection points, fueling and watering facilities, and near railroad crossings.

Burned rails are not, however, limited to such locations. They also are found at many points where trains usually are in motion—where trains enter or leave yards, on long grades, at tops of hills, where snow drifts are bucked, where weeds overgrow the rails, at oiled highway crossings and on curves. Improperly maintained rail-and-flange lubricators also will induce wheel spinning. Many old timers also will want to include areas where grasshoppers and crickets have overrun the right of way.

When the drivers slip long enough, they raise the temperature of the rail surface through friction, often beyond the critical point to the molten stage. The rail steel literally is ground out, and frequently a heap of the removed metal will be found at one end of the burn. Laboratory tests, as conducted by the AREA Rail committee, show that, as soon as the wheel leaves the burn, air, along with the cooler temperature of the adjacent rail steel, acts as a quench. This forms a hard martensitic structure at the rail surface, with small incipient cracks. If the rail is left in service without being repaired, the latter tend to grow progressively, sometimes resulting in rupture of the rail.

does, a progressive fracture is the end result. Grinding out or using a torch to remove defective metal can cover up many incipient cracks.

"No matter how rigid a specification you devise for the correct welding of engine burns, the work is going to be done by one man, the welder. I have as good a group of welders as any road in the country. But my common sense tells me that the law of averages will give me some poor ones. The poor ones can botch up any job.

"Also, my welders are accustomed to building up rail ends and have become proficient in applying thin deposits. To ask them now to weld engine burns as much as ⅜ in deep is just asking for trouble. All of them cannot make this change without making some mistakes. I don't want to chance those mistakes."

Portable testing instrument

The roads which do not weld engine burns were asked if they would start this practice if a good portable instrument for testing welds was made available. Only two of the seven said they would give consideration to welding in that event. This would seem to indicate that the five other roads either do not question that a good weld could be made over a burn or that they doubt the infallibility of such an instrument.

Two roads which do weld burns commented on the desirability of having such an instrument. One stated that "if such an instrument were made available at a justified cost, it would be most desirable for our use."

"This question," said the Milwaukee, "is based on the premise that a weld is either defective or not defective. These conditions prevail only at a specific time. Every weld will result in residual stresses of tension in the top of the ball of the rail. Repeated flexing of the weld area will develop, under loading, fatigue limits of the steel. If you test upon completing a weld, it is OK. You can test again one year later and find small defects. So we must not imply that if a weld is all right when welded it will be the same two years later."

But even the roads which object to the practice of welding engine burns don't remove all burned rails. They say it depends on the number and depth of the burns. One road states that if a burn extends to the edge of the ball, the rail is removed. The less severely burned rails are left in the track. Two other roads stated that only the badly burned rails are removed, and the lighter burns are dressed off by grinding.

Another road declared: "If the burn is such as to cause impact of sufficient force to affect track maintenance, the rail is removed. Rails burned by drivers of a locomotive used in bucking snow drifts, and

Some railroads object to th prac

those located by certain indications on the tape of a detector car, are removed immediately." All seven of the roads which do not weld burns stated that they depended upon regular testing by a detector car to determine later on if the lightly burned rails should be removed from the track.

Failures occur at welds

The repairing of engine burns by welding is not a new development. The chief engineer of one road reported his road has been doing this for more than 25 years on all classes of main track. He added: "A few of the built-up burns have failed in service. We attribute these failures to lack of care on the part of the welders. Probably they did not remove the original fracture completely before starting to weld."

"We had very good luck with our engine-burn welding," stated the chief engineer of another road. "But I must admit that there were instances where fissures developed under the weld and we had service failures."

The supervisor of welding on another road declared that his road had been welding engine burns for many years with no failures reported. And, he added, welding practices today are much better than they were a few years ago. He admitted, however, that it was possible that some rails might have failed at engine-burn welds and were removed from the track without being reported.

A superintendent of track welding stated that he proceeds on the basis that every engine-burn weld will fail. The roadmasters are instructed to have their men apply joint bars with two bolts to rails at any engine burn that requires building up. If a rail should break at the weld, the bars hold the two new ends in alinement and the section forces add two more bolts, With this policy, he obtains the full service life of the rail. It also permits him to weld deeper welds than are repaired on most railroads, even down to the railhead fillet. It was his belief, however, that rails of 131-lb section and heavier would not break in service if properly welded, provided that the weld was not more than ⅛ in deep.

practice of welding driver burns but others have been doing it as long as 25 years

Two roads mentioned that the welding of engine burns should be done only by competent welders. "We feel it necessary," said one road, "that the welder selected to do this type of work be thoroughly familiar with what is to be accomplished. Only those selected are permitted to weld driver burns."

On still another road "only welders qualified by a representative of the chief engineer will be permitted to weld engine-driver burns. Qualification information shall be entered on the roster of rail-end welders."

Metallurgically satisfactory

It should be noted that a comprehensive investigation into the metallurgical aspects of engine-burn damage has been made by the AREA Rail committee.

Drop tests were initially attempted by this committee to evaluate the strength of repaired engine-burn specimens. It was concluded that this test was not satisfactory and it was abandoned.

Rolling-load tests were then instituted. Wheel-burn specimens were made under controlled conditions and these were tested under different conditions. Although considerable "scatter" in results was obtained from these tests, it was found that the specimens repaired by welding performed for a longer number of cycles than the unwelded.

The Rail committee reported in 1952 that the repair of damaged rail by removing the parent metal containing the quench cracks and replacing it with weld metal was found to be satisfactory from a metallurgical standpoint. It further stated that its laboratory investigations and service experience proved the desirability of repairing engine burns by welding rather than leaving them in the track in an unwelded condition. Three advantages of this practice were pointed out. (1) It eliminated the undesirable microstructure and quench cracks, which can serve as potential stress raisers. (2) It eliminates low spots in the rail surface at the very point of weakness metallurgically. And, (3) it permits the recovery of much rail for main-line use which would otherwise be scrapped or consigned to secondary service.

Restrictions as to the depth of the engine burn and the number per rail are set by the majority of the 22 roads welding burns. Some also advised of having restrictions on the length of welds and others on the distance between welds.

For the most part, the depth of burns to be welded was limited to from ¼ in to ⅜ in. Two roads reported no limit on the depth. Eight roads advised that they had no limit on the number of welds per rail.

Those roads limiting the number of welds per rail were asked how they could determine whether or not the rail had been previously welded. One stated that it kept a running record of all burns welded. Two others replied that the welds were marked by paint dabbed on the rail. Most roads stated that previous welds are made known by a change in the color of the steel, although this was questioned by one road. Some roads stated they didn't care to know about previous welds as long as the present condition of the rail showed that it was good enough to weld.

One road stated that the number of burns which could be welded depended upon the economy of doing this work. But it did not say what this number was.

What about the cost?

The question of the economy of welding engine burns was not raised in the questionnaire. But at $114 per net ton, a 39-ft rail of 115 lb section would cost about $85 and a 132-lb rail $98. Labor cost would run at least $10 for replacing a rail, giving a total cost of from $95 to $108 per rail in place. Allowing for the scrap value of the removed rails, the net cost of replacing driver-burned rails would run from $60 to $67 per rail.

One road reported that it had welded 456 engine burns at an average cost of $1.25 per weld for labor and material. This cost appears to be too low for the average railroad. A sampling of a few railroads shows costs ranging from $2 to $12 per engine-burn weld. Using $7 per weld as an average, it is apparent that from 8 to 9 engine burns per rail are economically justified.

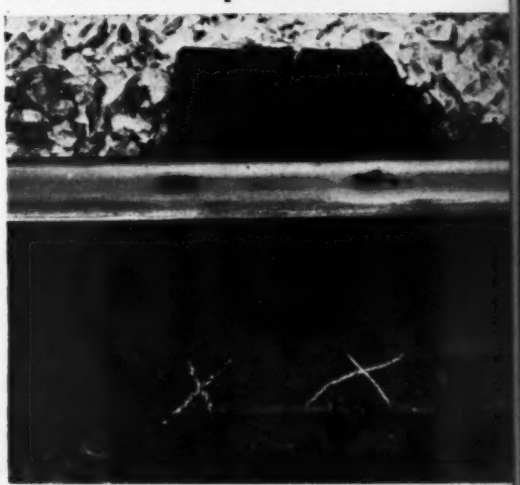
Before depositing weld metal when repairing a wheel burn, the damaged rail metal must be removed. Replies from reporting roads show this is done either by grinding or by using the welding torch. The majority prefer to do this work by grinding. The reasons given for this preference are that it does not heat the rail as much as a torch, it does less damage to the parent metal, there is less possibility of covering the quench cracks, it permits a better visual inspection of the cavity, enables better control in removing the metal, and grinding is more practical and economical.

On the other hand, four roads preferred the welding torch for this work. Among the reasons advanced for this preference are that grinding makes too large an area to weld, the torch is less expensive, it is more practical because the welder uses the same equipment for welding, and it is more effective.

Six roads reported that they used both the grinding wheel and the welding torch for this purpose. However, two of these stated a preference for grinding, and one for the torch. The other three did not state any preference but left this to the option of the welder.

Regardless of whether a road uses the grinding wheel or the torch for removing the damaged metal, there was great uniformity in the manner of assuring the removal of all quench cracks. In general, this follows the method proposed by the Rail committee in its suggested specifications

See how these burns were repaired ▶



presented in 1957. This reads as follows:

"Spread the heat from the flame uniformly to produce an even dull-red color over the floor of the cavity. Then lift the torch momentarily and watch for any irregular appearance of the heated area as it starts to cool. If there is a crack or fissure at or very near the surface, its course will be outlined by a concentration of brighter color along its edges. The abrupt appearance of a bright spot or area in the floor of the cavity indicates a horizontal fissure below the floor, which must be washed out. If there are no defects in the floor of the cavity, it will darken uniformly as it cools."

A discouraging note was sounded by one chief engineer. He said "in my opinion, there is absolutely no sure method for determining when all cracks have been removed. This depends upon the eyes of the operator." His road, incidentally, is one which does weld engine burns.

Preventing rail dip

Most roads reported that before any welding is attempted, the ties under the burn should be firmly tamped. Some roads use shims to raise the rail so as to place the head in tension.

It is not readily discernible from the replies whether or not all roads that weld burns preheat the rail. Ten roads did not indicate any preheating or postheating. And, when asked how they prevent rail droop, they replied that they avoided heat penetration by applying the metal deposit in small increments, by skip welding, working rapidly, using shims under the rail, or by heating the base of the rail if a dip did occur.

One road reported that, after raising the ties, it applies a pair of joint bars where the welding is to be done by means of one or two special "C" clamps. The latter are applied from the underside of the rail and are easily detachable after the welding is completed. By using this method the dipping, due to heat or passing trains, is avoided, said this road.

The one road which reported it used the electric-arc method of welding, stated that heat penetration by this method was very small and that the joint bars applied by two bolts help prevent part of the dipping. Another remedy suggested by this road was to deposit the weld metal slightly high and to make the finish grind after the weld is cold.

Preheating usually is done by playing a flame on each side of the rail for several minutes to warm the rail

1 TAMPING THE TIES before welding—or shimming the rail—is considered essential by many roads to place rail head in tension.

2 DAMAGED METAL is removed from the burned area either by grinding, as some roads prefer, or by welding torch.

3 INSI... that...

Sequence of welding repair operations

Only a slight raise is given the tie before it is tamped. Some roads preheat and postheat the base and web before and after the welding. In these views, where temporary bars and "C" clamps are used, only the area surrounding the ground cavity is heated before welding and the postheating is done after the bars are removed. The latter work must be done very carefully to prevent the rail from warping. When surface grinding, the weight of the wheel and attachment are sufficient so no further pressure is required. (Photos courtesy Norfolk & Western)

4 HEATING of the cavity will often reveal cracks which have not been removed.

5 WELD METAL, applied in small increments, is hammered to roughly shape it to the ball.

6 SU... re...

base and lower web. The extent of this area on the base ranged from 2 in to 10 in longer than the burn.

Welding procedure

In general, welding procedure on most roads follows the method suggested in 1957 by the Rail committee. No welding is normally attempted during rain or snow precipitation, in areas exposed to water spray, or when the temperature is below 32 deg F. Preliminary heating to about 500 deg also includes from ½ in to 1 in of the metal surrounding the cavity. This is done to prevent too rapid cooling.

Most roads start the weld deposit at the welder end and work away. The metal is deposited in about 1-in wide beads in increments ranging from 1½ in to 4 in long. For the longer burns, the weld metal is applied in 2-in increments to avoid excessive heat penetration. The weld deposit is peened as it cools, but while the steel is at red heat.

The road using the electric-arc process advises that it preheats the area to 500 deg F in not less than 5 min to warm up the web. The weld metal is applied by first laying a bead down the center of the ball, then laying beads alongside on each side of the first. This is done, the road states, to draw down any martensite which may have formed under the first bead deposited.

How welds are postheated

At the finish of the welding, the roads which postheat again use flames on each side of the rail to heat the base for a distance of 10 to 12 in under the driver burn. A covering material of asbestos, aluminum foil, or metal flashing is sometimes laid over the areas to prevent rapid cooling.

The roads were equally divided in using the ¼-in and 3/16-in welding rods for welding engine burns. These are Linde's MW and Driburn rods and Airco's RR rod. Two roads stated they used "approved" rods, one a nickel-alloy rod, and two didn't answer this question.

The welding tips reported used for this work are No. 8, No. 10, No. 40 and No. 70. A few roads mentioned instructions for the adjustment of the flame. One stated it wanted a barely perceptible feather cone, about one-eighth the length of the inner cone, to produce a neutral flame. Three others reported a preference for a feather cone equal to about one-half the length of the inner cone to produce a slightly carburizing flame.

Surface grinding

Surface grinding is done after the rail has cooled. There was some range in thought as to the "coolness" temperature at which the grinding should be done. One road stated that grinding should not be attempted until the temperature was 1,000 deg F, or less. Another road stipulated "not over 400 deg F," another "while warm but under 200 deg F," and another that the rail should "cool for 15 min before grinding."

For the most part, grinding wheels 8 in by 1 in or 8 in by 2 in, having either an A14 or A16 grit, were reported used for this purpose. All roads stated that the wheels should be used with a light pressure, which a few roads described as "not enough to heat the rail to blue."

Several roads reported that the completed welds were tested for hardness, the aim being to get a Brinell hardness reading of "not more than 40 points above the parent steel."

Some use grinding train

Eight roads reported that the use of the Speno grinding train has materially reduced the number of engine burns to be welded. "Starting in 1957," one road stated, "we began to reduce the amount of repairs to wheel-burned rail by welding, and we inaugurated a small program of grinding damaged rails with the Speno rail-grinding equipment.

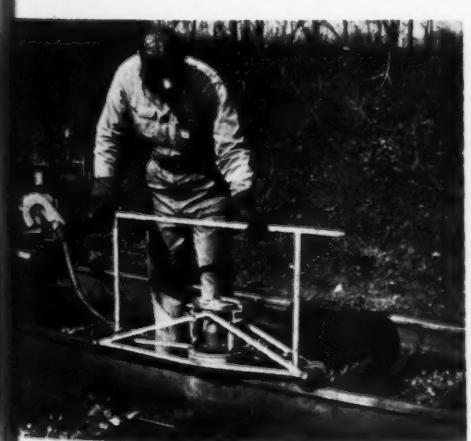
"This method of procedure will be followed on a much larger scale during the current year. We have found that the results obtained from it are much more satisfactory than that from repairs by welding. While this method will not remove the deep burns, it does remove the shallow ones and all of the upset metal. Many of the deeper burns are ground to such an extent that they are bridged over and for that reason are not noticeable while trains are passing over them.

"Evaluating the results obtained in building up the damaged rails by welding and in using the Speno rail-grinding equipment will result in our reducing the repairs by welding to a minimum this year. No doubt, this practice will be discontinued almost completely prior to 1959."

Use of portable grinders

Five roads reported they used flexible-shaft, side-angle, or surface grinders to some extent in removing engine burns. It was explained that this method was used only for the shallower burns. One road stated that grinders were employed only to remove the upset metal. Two others stated the grinding was done by several passes and was tapered to the running surface. However, one road advised it will discontinue this practice in favor of welding because, after a year's service under moderate traffic, it found that considerable batter had resulted.

INSPECTION of cavity must be made to be sure that all incipient cracks have been removed.



SURFACE GRINDING, after weld metal has cooled, restores ball to normal contour.

Upkeep costs go down

with this overpass decking

Construction used on Reading consists of bituminous concrete placed over planks fastened with steel strapping and covered with welded wire fabric.

● Savings are being realized on the Reading in the cost of maintaining some of its highway overpasses. They are attributed to a new method of resurfacing the decks of these structures.

The new process consists of bituminous concrete spread over 4-in by 10-in planking to which has been anchored a network of steel strapping topped by welded wire fabric. The strapping is secured to the planking and stringers underneath by long drive spikes. The wire fabric is welded to the strapping.

Use of the strapping is said to add rigidity to the bridge deck and to eliminate plank movement under traffic. Purpose of the steel fabric is to enable the bituminous concrete to resist the pushing and shoving action of tires, and to keep the riding surface from becoming uneven.

Of the 2,128 bridges on the Reading System, more than 200 carry state, country or municipal roads over the right of way. The railroad is responsible for the maintenance of many of these structures. About 100 of the highway bridges in the past have been decked with composition plank, which was found to require considerable maintenance and repair work. On the other hand reports indicate that the bridges redecked with bituminous concrete reinforced by welded wire fabric have required a minimum of maintenance.

In converting from the old deck to the new surface, the Reading maintenance forces work on a schedule designed to keep traffic delays to a minimum, and to reduce costs of traffic flagmen (required by the state, where state highways are involved).

First, the old wearing surface is ripped up and the basic 4-in by 10-in yellow pine planking is placed across the entire width of the bridge. Broken or deteriorated timbers are replaced. The planking is placed transversely on the birdge, at right angles to the supporting stringers.

Next, 1½-in by ½-in steel strapping is placed at 45 deg. to the planking on 2-ft centers over half the bridge. (Traffic continues over the other half on the exposed planks). The strapping is punched with 13/16-in holes on 4-in centers. It is placed at an angle of 45 deg. for two reasons: (1) To enable it to act as a hold-down for the planking; and (2) to prevent the completed bituminous surface from being rutted down between the straps by traffic, which might occur if the straps were parallel to the axis of the bridge.

The strapping is secured to the bridge floor with ⅝-in by 1-in washerhead drive spikes which bind the entire planking system tightly to the stringers.

In the second work stage the welded wire fabric is placed and welded to the strapping system. The fabric used is style 6 x 6-6/6 in rolls (six-gauge wire spaced at 6-in centers in each direction) and is furnished without any overhanging transverse wires. The fabric is placed in lengths parallel to the axis of the bridge, with the lengths being butted snugly and tack welded together on 12-in centers. The fabric is welded to the diagonal strapping every 12 to 18 in and is also welded where a wire passes over a drive spike.

When the welding has been completed, the deck is ready for the bituminous concrete wearing surface. This step, however, is preceded by cleaning the surface and drying the plank flooring with a torch, when necessary after snow or rain.

Next a primer course or tack coat of asphalt emulsion is spread over the planking, straps and fabric. The first course of bituminous concrete, 1½ in thick, with aggregate having a maximum size of 1 in, is then spread and raked and leveled by hand.

After compaction of the base course, a second course, with a maximum aggregate of ⅜ in, is placed to a thickness of 1 in. Two wood removable screeds, curved to match the crown of the overpass, are used to shape the surface to the correct profile, and removed before final compaction. Final step is to sprinkle the top course with a screening of light stone dust to seal the surface.

The surfacing on the completed half of the bridge is allowed to "set up" for 24 hr before opening to traffic. It is then placed in surface and the sequence of operations is repeated for the second half of the bridge.

The 24-hr "set-up" period was arrived at through an experience when traffic was allowed on one of the earlier jobs almost immediately after placement. In this case the bituminous mix rutted and broke loose.

How it is done

1 Steel strapping has been placed and fastened with drive spikes that extend through planking into stringers. Wire fabric is then laid.

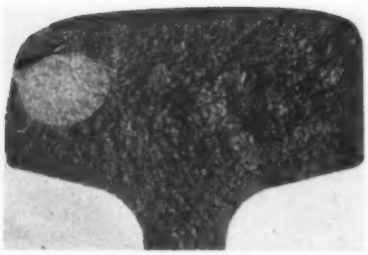
2 Lengths of wire fabric are tack welded to each other on 12-in centers. Wires are welded to strapping at 12 to 18-in intervals.

3 Where necessary following snow or rain a torch is used to dry off planking before applying first course of wearing surface.

4 Tack coat of asphalt emulsion is applied over planking by men at left. Other man is leveling screed to give proper surface.

5 Base course of bituminous concrete wearing surface is being applied here. Man in foreground is standing on removable screed.

6 Base course, 1½ in thick, is compacted by Huber roller. The final course, 1 in thick, will then be placed, after removal of screed.



DETAILED FRACTURE caused by shelly condition, indicating separation of metal about ¼ in below the top of rail. In this case there is no specific evidence of the flow of metal.

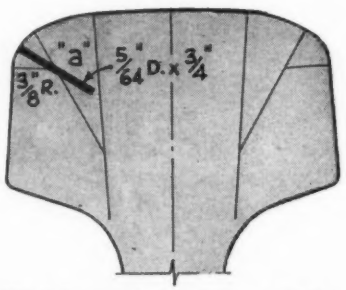
ANOTHER detailed fracture from shell in which the metal above the shell extends out beyond the gage face of the rail head. The familiar lip due to flow is evident on the opposite side of the rail.

Tests relate shelly rail to f

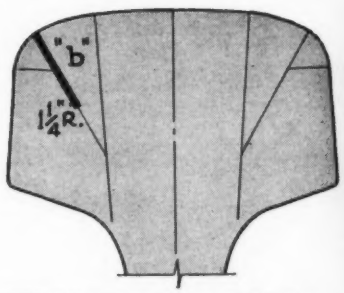
What happens when rail metal flows under heavy traffic? Brass pins inserted in the heads of three test rails gave the answer. Mr. Code describes the test in this article, which is adapted from a paper presented before the recent convention of the AREA.

The purpose of this test was to demonstrate that there is flow of the metal on the gage sides of rails on the high sides of curves and that this phenomenon is associated with shelling. Brass pins were placed perpendicular to the surface of the rail at several points around the gage corner of the rail head and these pins were spotted at 4-ft intervals throughout the length of three 140-lb RE rails. The drawings show the location of the pins with respect to the cross-section of the rail head. The diagram below the cross sections shows how these pins were distributed throughout the length of the rail. The three rails equipped with pins in this fashion were placed in the high side of a 4-deg curve in 1953.

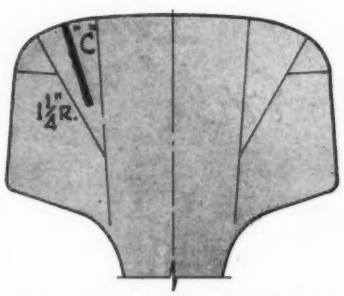
Where pins were located in test rails . . .



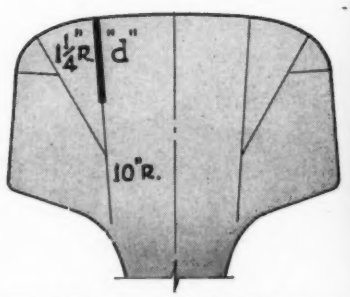
PIN "a" was placed at center of ⅜-in radius, 30 deg with horizontal.



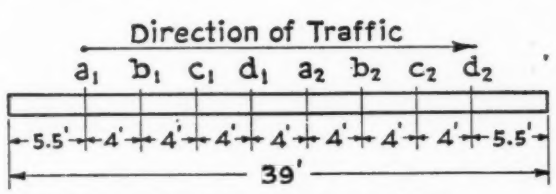
PIN "b" was on 1¼-in radius line at an angle of 60 deg with the horizontal.



PIN "c" was midway between "a" and "b," 73 deg with the horizontal.



PIN "d" was on 1¼-in radius line at an angle of 4 deg from the vertical.



HOW PINS were placed throughout lengths of rails.

• Track men are familiar with the plastic flow of metal in the rail head, although many of them may not think of it by that name. The lip which forms along the edge of the rail head, particularly on the low sides of curves, is a commonly recognized evidence of flow.

This has always seemed to me to be associated with the formation of the shelly spots with which we are so much concerned.

Earlier laboratory tests

Several years ago in one of our Rail Committee discussions on the cause of shelling, I suggested the possibility of studying the flow of metal in the rail head by inserting pins of a different metal in the rail. Professor R. E. Cramer (special research associate professor, University of Illinois) lost no time in trying this out in the laboratory, and the results of his tests on the rolling load machine were published in the AREA Bulletin for February 1952. The service test I am about to describe took a little longer.

ail to flow of metal under traffic

The rails were watched carefully throughout the time they were in track to detect possible formation of defects or fractures caused by the presence of the pins in heads. None was found.

After approximately three years service these rails were taken out of track and sectioned at the locations of pins to show the deformation in the pins. Photographs of sections at the pin locations are shown in the box. In the sections taken at the "a" and "b" locations you can see that the top of the pin bends toward the gage side of the rail. In the sections taken at the "c" and "d" locations nearer the center of the rail head, the pins also show definite deformation toward the gage side of the rail.

Not always recognized

The reason that this flow of metal toward the gage side is not always recognized is that, under ordinary circumstances, the overflowed metal is ground off by the wheel flanges as fast as it forms.

The presence of permanent deformation such as this is positive evidence that stresses have been experienced well beyond the yield point of the material. Otherwise, no such permanent deformation would be present.

By **C. J. Code**
Assistant Chief
Engineer Tests—M/W
Pennsylvania
Philadelphia, Pa.

You will notice that the tops of the pins at the "c" and "d" sections tend to disappear toward the top surface of the rail. The reason for this is that the metal flowed longitudinally along the rail head as well as laterally, so that the pin was distorted in two planes. Hence, the section at right angles does not show the complete length of the pin. Sections taken longitudinally through some of the pins confirmed the observation that deformation of the pins occurred in a longitudinal direction. This deformation was in the direction of traffic, i.e., the metal flowed with the movement of the wheels.

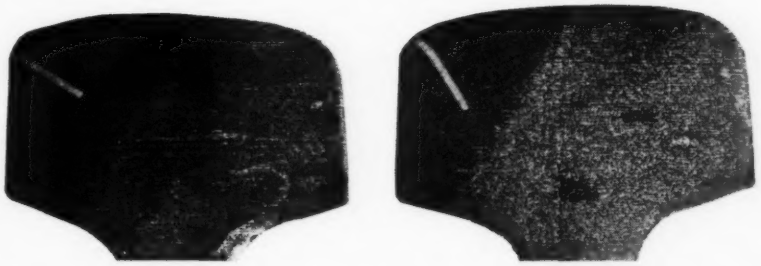
What the test shows

You might say that this test merely demonstrates something that we already knew to be the case. Nevertheless there seems to me to be a tendency to fail to recognize the fact that metal in the head of the rail becomes stressed beyond the yield point, in other words, is overstressed by wheel loads of existing magnitude. This seems to me to be a very important factor in connection with the formation of shells.

Apparently when the metal flows beyond a certain point, a separation takes place. This is the phenomenon which we know as shelling. It is probably not as simple as that, and there are certainly other factors which contribute to shelling. However, this seems to me to be the primary factor, i.e., that the material is overstressed by today's wheel loads.

The primary remedy would seem to lie in resisting any tendency to increase today's wheel loads and in working toward the development of a rail steel at an economical price which will resist to the greatest extent this tendency to flow under heavy stress.

. . . and what happened to them under traffic



SECTIONS of test rails, taken after three years of service, showed that the tops of the pins at the "a" and "b" locations were bent over toward the gage side of the rail.

SECTIONS at the "c" and "d" pin locations, nearer the center of the rail head, show that the pins not only are bent but tend to disappear toward the rail surface.

The drawings and photographs shown here tell just about the whole story. What do they prove? "The presence of permanent deformation such as this," states Mr. Code, "is positive evidence that stresses have been experienced well beyond the yield point of the material. Otherwise, no such permanent deformation would be present."

Poling plates help ge

ASSEMBLED liner-plate section about to be lifted by crane and placed in trench (not visible).

When this section had been installed in trench . . .

. . . Additional rings went in by tunneling like this

POLING PLATES in position around starting section which has been partially backfilled in preparation for tunneling.

● It wasn't excessively long but it was plenty big (120 in. in diameter), and they had to tunnel it through a fill. But by careful planning and the use of poling plates to facilitate tunneling they got it through without serious incident except for the inconvenience and delay caused when an old timber bent was encountered.

But let's start at the beginning:

Just east of Bonners Ferry, Ida., the Great Northern's main line parallels the Kootenai river. During recent years the river has periodically flooded the lowland on the opposite side of the track.

Larger opening needed

An existing drainage opening under the track did not have enough waterway area to permit satisfactory flow of flood waters to the lowland. For this reason the road's engineers decided that an additional opening through the fill was needed to permit the water levels on each side of the track to be more quickly equalized. This would minimize the possibility of washouts.

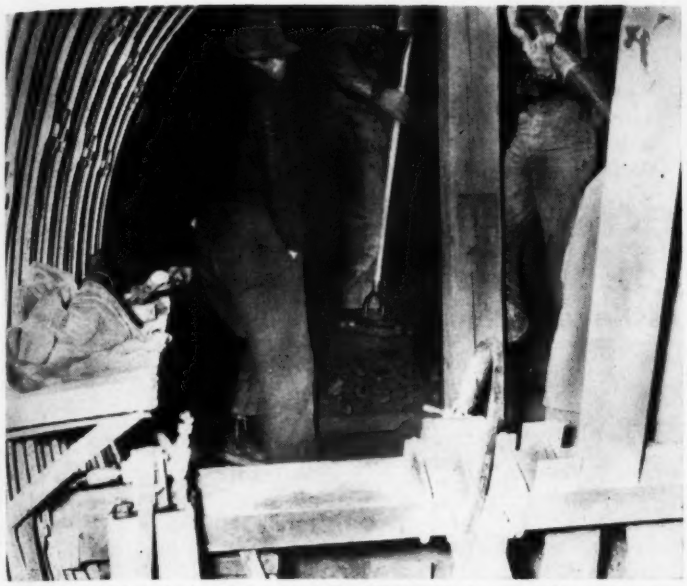
To solve the problem without interrupting traffic, a 120-in diameter opening was made by tunneling through the fill with 3-gage Armco liner plates. Work was started by digging an approach trench in the river side of the fill. Timber rails were set on the line and grade of the culvert as a guide to subsequent operations. The grade line was controlled to provide a slight camber at the middle of the structure.

Then a 9-ring section, 13 ft 6 in long, of liner plates was assembled near the job site and set in the trench on the timber guide rails. Poling plates were assembled on the top of the section. The section was backfilled and the tunneling operation got underway.

The poling plates were pushed ahead of the excavation by means of a special jacking frame devised by the Great Northern. Starting at the top and working down, the poling plates were jacked individually into the fill. The tunnel heading was excavated until enough clearance was

TIMBER piles in old timber bent were cut with an electric chain saw.

get big culvert through fill



JACKING FRAME pushed poling plates into fill ahead of excavating work. Successive 18-in liner-plate rings were then inserted.

WEDGES and poling plates at tunnel heading. Coarse material at top of heading caused some difficulty.

made for the next 18-inch-wide ring of liner plates. When these had been installed the tunneling procedure was continued with the aid of the poling plates.

Although the fill consisted mostly of fine sandy silt, the top of the heading consisted of coarse sand and rocks that caused some difficulty in excavation. The heading was worked full height and breast boards were used where necessary. Mucking was done with hand shovels. A power conveyer carried the excavated material to a flume where it was sluiced into the river.

During tunneling operations workmen encountered an eight-pile timber bent that had supported the track many years ago. Because the old piles and braces were located almost in the center of the heading, they had to be cut with an electric chain saw as the work progressed.

When the liner plate assembly had been completed, steel sheet piles were driven along the toe of the fill at each end of the culvert. These extend 5 ft above the flow line and serve as half-height headwalls for the culvert. Riprap on both slopes of the fill above the sheeting provides added protection during high water.

There were, of course, no delays to traffic while the culvert was being installed.

MUCK was carried out of tunnel by power conveyor and delivered to sluice box for disposal.

Short line ore carrier . . .

ORE TRAIN begins its 26-mile trip to the smelter at Anaconda, Mont.

Uses penta-treated wood . . .

• On the Butte, Anaconda & Pacific they can tell you all about penta pressure-treated ties. They ought to know because they've been using them exclusively since 1952, both for renewals and for new construction, of which there has been considerable on this subsidiary line of the Anaconda Company, one of the world's largest copper companies.

Ten million tons of ore

The line runs between the parent company's copper, zinc and manganese mines at Butte, Mont., and the ore reduction or smelting facilities at Anaconda, 26 miles away. It operates around the clock to haul 27,000 to 30,000 tons of white ore a day. Normally there are five mainline round trips daily, and each train consists of 80 to 100 cars. The volume of ore carried by the road in 1956 came to 10,000,000 tons. Total traffic, including all commodities handled, amounted to 18,000,000 tons.

Douglas fir ties used

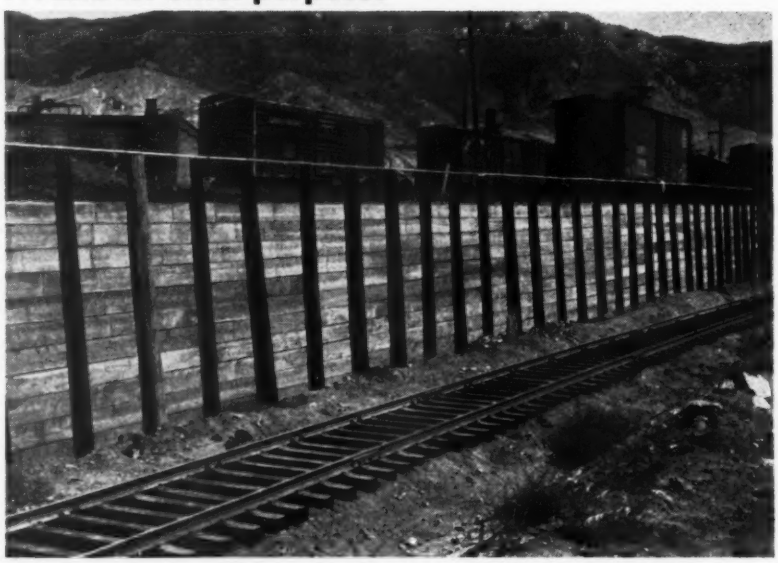
Crossties used on the BA&P are Douglas fir and are pressure-treated with penta to a retention of 8 lb per cu ft. The treating is done by the Montana Pole & Treating Co., Butte. About 10,000 ties are installed in renewals each year, and this year an additional 10,000 to 12,000 ties are being inserted in a new yard being built at Butte. Track crews on the BA&P reportedly like the penta-treated ties because, they say, these ties are easy to handle.

Penta-treated wood has also been used for other puposes, including the posts for a timber retaining wall at the new yard in Butte.

. . . for all crosstie requirements . . .

NEW YARD at Butte required 10,000 to 12,000 new ties, all treated with penta.

. . . and for other purposes



POLES supporting this retaining wall at the new yard are also penta treated.

CNR develops

Training program for B&B foremen

Bridge and building foremen on the Western Region of the Canadian National are now going to school. They're not only learning more about the mechanical aspects of their jobs but they're being taught how to be better leaders. And plans are afoot for broadening the program to cover track foremen, work-equipment operators and others.

This article tells why and how the program was conceived and how it is being carried out. It is based on information furnished by J. A. Peebles, assistant to chief engineer of the CNR system, who, as training supervisor, had responsibility for formulating and executing the program. Here are the main points covered in the article:

- **Why the program was started**
- **Basic objectives of the program**
- **Who is trained and why**
- **Courses given and how presented**
- **Employee and management benefits**
- **Plans for training other employees**

● The depression years, World War II and the post-war construction boom all played a major role in depleting a once well-manned and efficient working force on the CNR's Western Region.

Management and brotherhood were equally concerned. Brotherhood officials in Western Canada did not relish the picture of contractors performing work, much of which, with a skilled reservoir of B&B labor, could be performed by the railway's own forces. Management was sympathetic to the brotherhood's plight and fully cognizant of the advantages accruing from a well-staffed and efficient maintenance-of-way department.

To re-establish such an organization, it was evident that a training program was needed. Whenever management and brotherhood representatives met at union-management cooperative meetings on the Western Region, the subject of training occupied a prominent place on the agenda. During the 1953 system union-management cooperative meetings, in Montreal, the Western Region representatives were given a "clear board" to develop a training program for B&B foremen.

Master plan developed

The help of the training division of the personnel department was enlisted. Working cooperatively with the headquarters engineering staff, a master plan was developed, which was approved by union and management as a practical approach to a practical problem. To implement the first step management selected a training supervisor acceptable to the brotherhood from its engineering personnel and gave him the opportunity to learn the techniques of proper job instruction, the basic principles of good human relations or leadership, appraisal of individuals, etc.

Equipped with the tools of his trade, the training supervisor returned to Winnipeg to report to a planning committee composed of senior officers of the brotherhood and of management. This committee defined the knowledge and skills of an ideal B&B foreman and directed the training supervisor to conduct a survey of training needs of the 135 foremen on the Western Region (according to a formula developed by the personnel department). The purpose of this survey was to determine what knowledges and skills were lacking, and so provide a foundation on which to build a training curricula.

When the mission had been accomplished and the results made known the planning committee delegated an education committee composed at that time of C. Smith, secretary-treasurer (now general chairman), Brotherhood of Maintenance of Way Employees, Western Region, J. Conrad, engineer M/W, Western Region, and the training supervisor to prepare a curricula to meet the more urgent needs. To be practical the instruction had to be given within a period of 21-25 working days and the foreman trainee returned to his division. The curricula were designed, instructional material prepared and the stage set for training.

Management and brotherhood now sat down and determined the conditions under which the training would be given. Agreement was reached on all points covered in the schedule. No provision was made in the agreement that training was to be necessary pre-requisite for promotion.

Objectives of the program

What is the objective of the training program? It may be defined as follows:

To provide B&B foremen with the more necessary tools of their trade such as: The ability to properly instruct juniors; improved leadership qualities; a desire to learn; cost and safety consciousness; an improved general understanding of B&B work and of their ability to plan; and, finally, the knowledge that they are not just numbers, but important members of a railway family whose loyalty and service is very much appreciated.

As this program developed through union-management cooperative meetings, the same cooperation obtains in the selection of trainees.

Master plan for setting up training program for B&B foremen

Once the need for a training program for B&B foremen had been established the first step toward filling the need was the creation of a master plan. This was done as a cooperative project between the training division of the personnel department and the road's headquarters engineering staff. Here, in summary, are the successive steps outlined by the master plan:

Step 1—Appoint a supervisor of training, B&B department, Western Region. (A tentative list of the training supervisor's duties was included as an aid to his selection.)

Step 2—The appointee should immediately (a) spend some time in the personnel department for training in survey and appraisal technique, and (b) attend courses at the Institute of Personnel Development, Toronto, for basic instruction in conference leadership and supervisory training.

Step 3—Set up a Planning committee of qualified men, including representatives from the brotherhood. Duties of this committee are to assist the supervisor of training in the development of a foremen's training program.

Step 4—First stage in the Planning committee's work would be (a) to analyze and list the foremen's problems and responsibilities, and (b) to classify these into subjects.

Step 5—Take an inventory of all foremen on the region by name, location, nature of work, age and retirement date, these data to be recorded on individual cards.

Step 6—Make individual performance appraisals of all foremen to determine what skills are in short supply, e.g., who will be trained and in what subjects. (The appraisal procedure required the use of an original form tailored to B&B work situations. In use, a small committee comprised of the foremen's superiors, a representative of the brotherhood and the supervisor of training sat down to review past performance in comparison with job requirements). The information resulting from this individualized survey was then used to build courses on a basis of known needs.

Step 7—Selection of men to be trained in foremanship, these to include (a) present incumbents, and (b) student-foremen in training to provide for present requirements and for replacements. Suggestion is that management and union agree on a reasonable qualifying standard.

They are generally B&B foremen, relief B&B foreman and painter foremen, although the classes have included two assistant foremen from regional steel bridge gangs and one pump repairman, who is a relieving B&B master. Numerically, the objective is to restrict the number to eight in any one class, as larger groups are considered unwieldy. Since most of the instruction is developed through discussion it is felt that classes of more than eight members would impose limitations on individual contributions.

Courses of study

The curricula as they are now constituted have been changed slightly and improved over the original offerings. Each group that has taken the course has contributed to the curricula either through additions or refinements, or both. The current breakdown is given in the table.

It will be appreciated that the time consumed on the various subjects will depend upon the group, but broadly speaking there are at least 5 periods of 1½ hr which are utilized to discuss work problems and possible solutions; use and methods of application of the various paints, varnishes and shellacs in railway work; furniture finishing; plumbing and pipe-fitting problems; common faults in pumping installations, etc.

At the three-quarter mark in the training interval it is explained to the group how they can further their knowledge by enrolling in home study courses. The cost and the method of procuring such courses is outlined and any interested foremen are referred to a railway representative for further information. As a point of interest about 15 per cent of the foremen attending training have enrolled in a comprehensive B&B foreman's correspondence course.

Present curricula for foremen training course

Subject	Days
Concrete	2.0
Job instruction	2.5
Tackle and rigging	2.5
Job relations	4.5
Knots and splicing	1.0
Care and use—electrical tools	0.5
Planning and estimating	0.5
Industrial trips	1.5
Job safety	0.5
Fire prevention	0.5
Explosives	0.5
First aid—five 2-hr sessions	1.5
Care and use internal combustion engines	0.5
Bridge and building plans	1.0
University laboratory	0.5
Course wind-up	0.5
Stair, roof and bridge framing	5.0

Visual aids employed during training consist of motion pictures obtained from industry, sound-slide case study problem strips, an opaque projector and tape recorder.

All groups are encouraged to talk over specific divisional problems and their solution especially during the evening "bull" sessions. This is a distinct asset where there are experienced and junior foremen in the one group.

Each foreman is given a loose leaf binder and hand-out notes on most courses. The material has been abstracted from text books, technical publications, pamphlets, etc., and rewritten for railway use.

The classroom to date has been a B&B diner equipped with a conference table, chairs, blackboard, projection screen, office desk and cupboards. This is a temporary measure and it is anticipated that permanent classroom facilities will be provided in the near future.

Foremen from distant points on the system are housed in modern bunk cars wired for electricity, and a terminal laborer is assigned as a "bull" cook to provide janitor service each day. Consideration is being given to establishing permanent training quarters.

During that part of the curricula listed as "industrial trips," the foremen trainees are taken to large new-construction sites in the vicinity. These trips serve a dual function. First, they provide knowledge of either services, products or construction methods, and, second, they act as a safety valve for a group of men accustomed to outdoor activity as opposed to classroom confinement.

Methods of teaching

A brief résumé of two of the courses will serve to illustrate the type of material offered and the manner in which instruction is given.

Five days are assigned to framing. During part of this period the trainees take instruction on the carpenter's square and its application in laying out the various rafter cuts. After the theory is imparted they build two model roofs using 1-in by 2-in spruce. These roofs are designed to illustrate all rafter cuts such as hip, valley cripple, jack and octagon.

Upon completion of the roofs the theory of bridge and stair framing is

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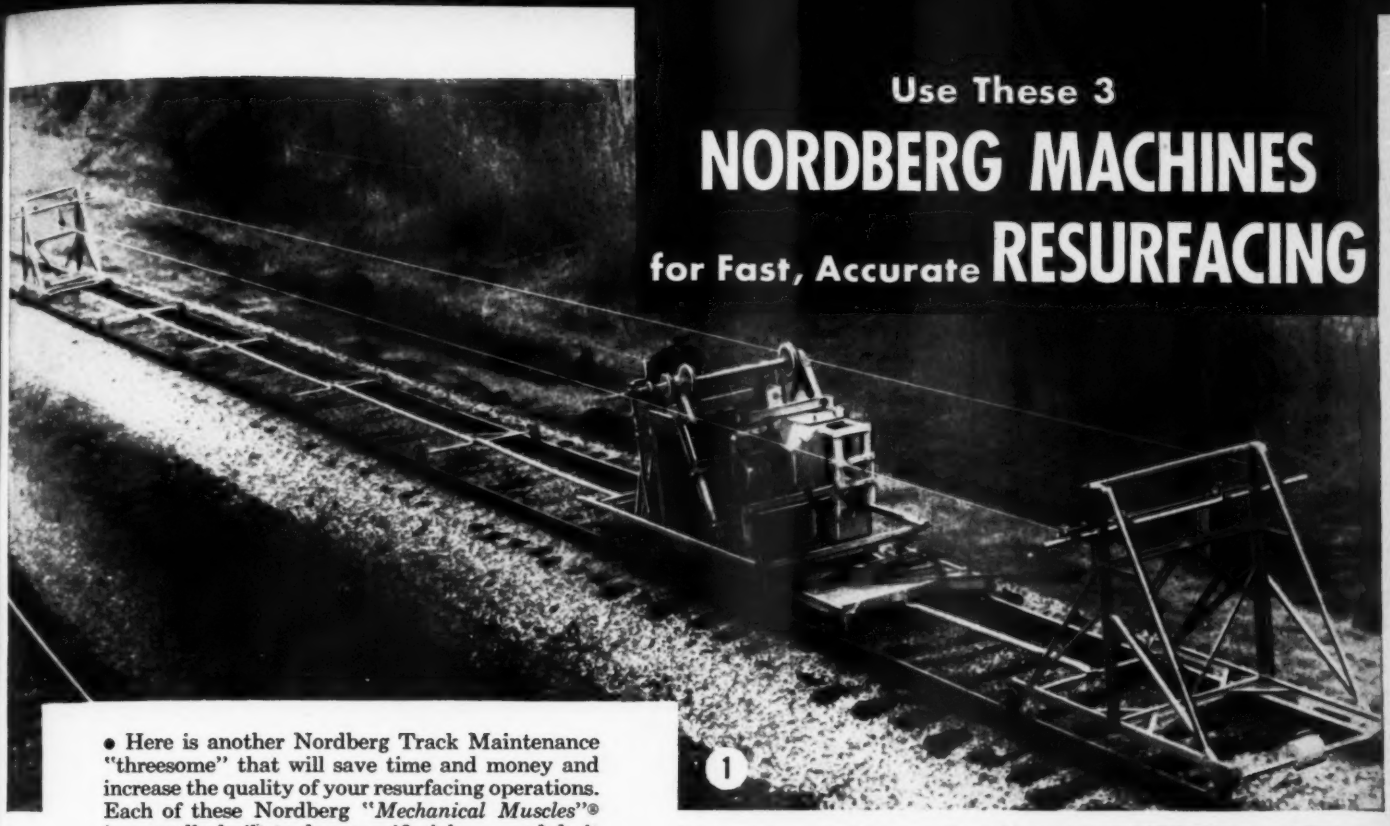

• Here is another Nordberg Track Maintenance "threesome" that will save time and money and increase the quality of your resurfacing operations. Each of these Nordberg "*Mechanical Muscles*"® is ruggedly built to do a specific job . . . and do it better, faster and at lower cost. Proved cost savings will soon write off your original equipment investment on each of these machines.

1 TRAK-SURFACER—TAMPING POWER JACK TEAM

The Nordberg Trak-Surfacer is an entirely new method of producing improved profile and surface that has proved its speed and accuracy on a number of the Nation's major railroads. The Trak-Surfacer employs a tightly drawn wire as a reference line for raising the Grade Rail. A Nordberg Tamping Power Jack, used as the central unit, raises the track to the wire, tamps the tie to hold the raise and provides propulsion power for itself and the entire Trak-Surfacer.

GANG TAMPER

2 Sixteen point tamping for raising or spot surfacing, this one-man machine tamps by impact, compression and vibration, with split tamping heads that tamp under one rail or both, as desired. Assures uniform quality tamping of every tie, every time, in any ballast.

NORDBERG "LINE INDICATOR"

3 Quick, lower cost lining of curves and tangent track is now possible with the Nordberg Line Indicator. Using the well-known Trakliner® as a central unit, this new "Mechanical Muscle" does the complete job of sighting and lining track.

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NORDBERG MFG. CO.
Milwaukee 1, Wisconsin

NORDBERG *Mechanical Muscles*®

CNR's training program for B&B foremen

taught. Four bents of a two-story bridge are framed, the men working in pairs, so that each pair completes one bent. The bridge is scaled down to one-quarter size, and 3-in by 3-in (spruce) is the maximum post and sill cross section. Batter, super-elevation and curvature are embodied in the design, and the trainees are taught how to calculate batter lengths and allowance for superelevation. They lay out, frame and erect the complete bent.

Along with the fundamentals to be observed in manufacturing quality concrete a practical demonstration is given of the strength variation produced by improper practices. Three 6-in by 12-in standard test cylinders are hand-mixed and poured to a design specification, say 3000 psi. One is mixed and cured in an approved manner. The second is allowed to dry out at room temperature after 24 hr curing. The third, with excess water in the mix, is cured in a manner similar to the first cylinder. After 28 days all cylinders are tested to destruction in the University of Manitoba Testing Laboratory with the trainees observing the results.

All material is presented in an easy, informal manner with the emphasis on discussion, and an earnest effort is made to have all trainees contribute. With their backgrounds available through survey data, additional consideration or help can be given to specific individuals during the training interval.

Who benefits and why

All classes are closely supervised and notations made on the Keysort record card of each man. Potential for advancement is noted in all cases, and the observations of individual instructors obtained. In this way each employee attending has an opportunity to display what he can do. Management benefits in at least two ways: Through firsthand knowledge obtained on potential assistant B&B masters, and through improved job performance.

In addition to the benefits derived from formal training, the younger foremen attending can discuss their problems with the more experienced men and obtain answers that will help them. Work methods unique to a particular man or division can be discussed and compared informally and off the record. All discussions involving personalities and problems of individuals are strictly confidential, and remain with the group unless a specific request is made or permission given to pass along the information to management.

Plans for the future

The future presents an ever-expanding field for training. Intensive mechanization programs for maintenance of way call for skilled operators and mechanics. High-speed traffic necessitates skilled section foremen and a closer tolerance on track maintenance. Construction demands skilled carpenters. Individual divisions would like tradesmen, such as plumbers and pipe fitters, on their staffs. With the stern competition offered by outside industry the solution to railroad problems lies in training their own forces, and active consideration is being given to establishing:

(1) Training programs on the Western Region for work equipment operators, section foremen and carpenters.

(2) Training programs on the Atlantic Region for work equipment operators and section foremen.

(3) B&B and work equipment training program on the Central Region.

The project to establish a B&B foremen training program has had the whole-hearted support and cooperation of the brotherhood, management and individual employees of the railway family. The personnel department has given counsel, encouragement and support throughout. Other industries, such as Canada Cement Company, Canadian General Electric Co., Ltd., and Canadian Industries, Ltd., have supplied technical literature, films and instruction.

Planning committee composed of these officers . . .

- Regional chief engineer
- Regional assistant chief engineer
- Engineer—maintenance of way
- Engineer of bridges
- Engineer of buildings
- B and B master, terminal division
- B and B master, "on-line" division
- General chairman, B.M.W.E.
- Assistant general chairman, B.M.W.E.
- Secretary-treasurer and vice-chairman, B.M.W.E.
- Training supervisor (chairman of meetings)

. . . Established this outline of knowledge and skills of the ideal B&B foreman

(1) Blueprint reading
(2) Framing—(a) bridges, (b) water tanks, (c) foundations, (d) snow sheds, (e) rock sheds, (f) tunnels
(3) Concrete work—(a) forming, (b) reinforcing, (c) gravel inspection, (d) mixing, (e) testing, (f) pouring, (g) stripping, (h) curing, (i) finishing, (j) waterproofing
(4) Care and use of hand tools
(5) Care and use of power tools
(6) Care and use of power machinery—(a) pumps, (b) cement mixers, (c) power wrenches, (d) power generating sets, (e) compressors, (f) jackhammers, (g) bulldozers, (h) dumpsters, (i) hoists—steam, (j) hoists—air, (k) hoists—engine, (l) pumpcrete machine
(7) Pile driving
(8) Accounting—timekeeping—requisitions, etc.
(9) Painting
(10) Plastering
(11) Bricklaying
(12) Plumbing
(13) Tinsmithing
(14) Pipefitting
(15) Explosives—handling and use of
(16) Maintaining traffic while working
(17) Shoring, cribbing, cofferdams
(18) Carpentry
(19) Water supply—basic knowledge
(20) Safety (accident prevention)
(21) Instruction to subordinates (job instruction)
(22) First aid
(23) Blacksmithing
(24) Knowledge of tackle; rigging
(25) Job relations

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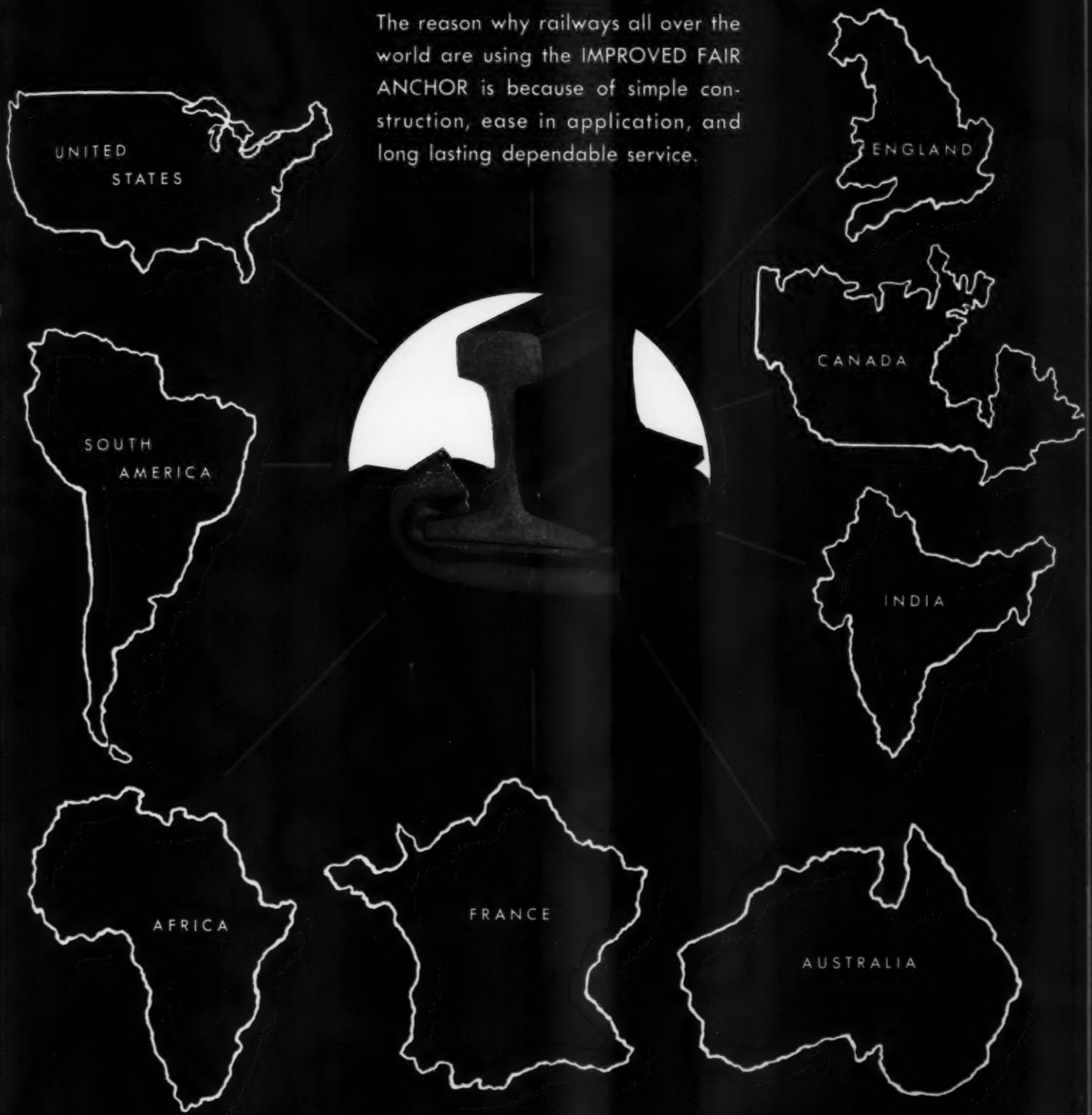
The reason why railways all over the world are using the IMPROVED FAIR ANCHOR is because of simple construction, ease in application, and long lasting dependable service.



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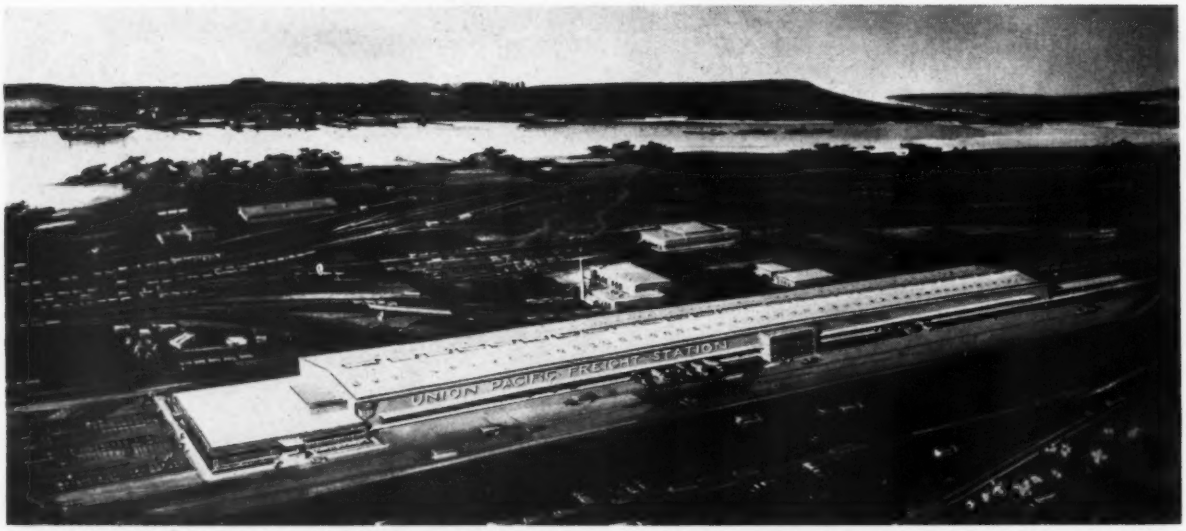
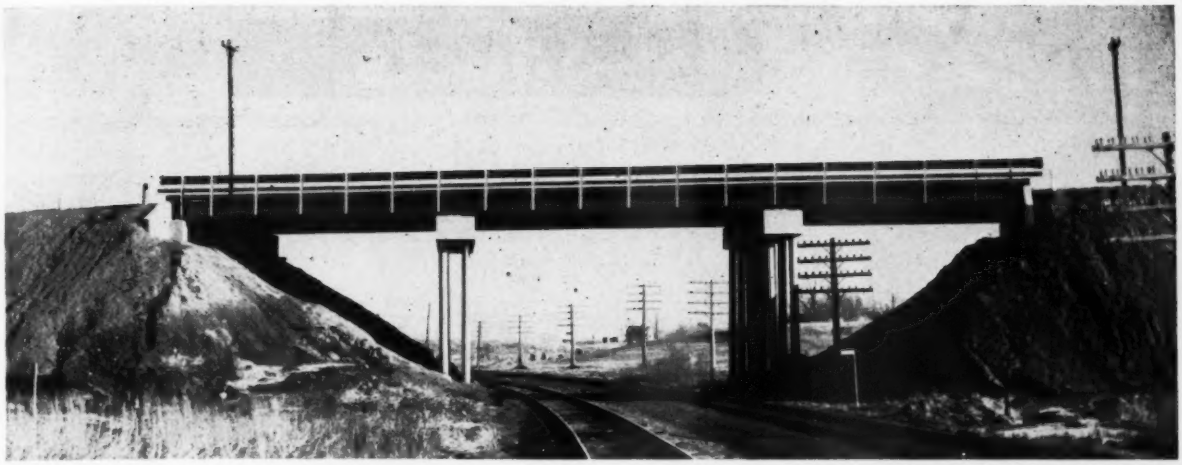
News briefs in pictures

CONSTRUCTION of a causeway to carry the Southern Pacific across the Great Salt Lake is considerably ahead of schedule, according to W. M. Jaekle, chief engineer. Shown at the upper right in this aerial view is the two-mile conveyor that delivers sand and gravel to a radial stacker from where it is loaded onto barges. Rock from quarries in foreground is delivered to dumping bridge, also for loading into barges that carry it into lake.

SLIDES AND SUBSIDENCE, following heavy rains produced this roller coaster effect in the Eel River canyon on the Northwestern Pacific. Always unstable, the walls of the canyon became saturated by rains totaling up to 78 in. The resulting slides and other troubles caused serious delays to traffic in February and early March on this company's main line in northern California.



CONSTRUCTION will start soon on this mammoth freight station on the Union Pacific in Portland, Ore. The building will be 1000 ft by 170 ft, large enough to accommodate a 90-car freight train inside the structure. Estimated cost is $2,000,000.



New Soo Line bridge is 113 feet long with 30-foot-wide roadway.

How To End Costly Bridge Maintenance

Soo Line Replacement of Old Timber Structure Features Armco Pipe Piles, Bridge Plank, Guardrail

An old timber bridge over the Soo Line tracks near Minneapolis had to be replaced. To eliminate future maintenance problems, the railroad designed a modern replacement structure to include Armco Steel Pipe Piles, Armco Bridge Plank and Armco FLEX-BEAM® Guardrail.

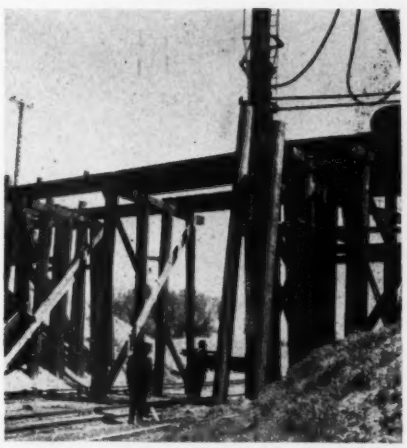
In addition to assured long life, Armco Products helped cut initial costs.

ARMCO PIPE PILES—More than 132 diameter-thickness combinations made it easy to select exact pile for H-20 loading.

ARMCO BRIDGE PLANK—Sections were ordered in 31'-1½" lengths to fit the bridge *exactly*. No field cutting necessary.

ARMCO GUARDRAIL—Quick and easy installation on angle iron posts saved time, trouble and money.

Send the coupon for data on Armco Pipe Piles, Armco Bridge Plank and Armco Guardrail. Armco Drainage & Metal Products, Inc., 5028 Curtis St., Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.



Armco Piles were driven for abutment foundations and center pier bents.

Armco Bridge Plank is welded to steel stringer spans. Asphalt paving completed the job.

ARMCO CONSTRUCTION PRODUCTS

Armco Drainage & Metal Products, Inc.
5028 Curtis Street, Middletown, Ohio

Send Facts About:
☐ Armco Guardrail
☐ Armco Bridge Plank
☐ Armco Pipe Piles

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Railroad_____

Street_____

City_____ Zone_____ State_____

Products

Odor and taste-free . . .

Water coolers

"COMPLETELY SANITARY" is the term used by the manufacturer to describe a new portable water cooler. Designated Arctic Boy, it is a galvanized cooler which is dipped in molten zinc after it is formed, thus sealing all seams and, it is said, making the product rust-proof, leak-proof and sanitary. These coolers are also lined with "Sparkleen" plastic which is baked on with infra-ray light for insuring permanency. This liner is said to keep the interior sparkling clean and odor and taste-free indefinitely. Heavy-duty stainless-steel models are furnished with styrofoam insulation, paper-cup dispenser lugs, and a heavy steel bottom band for extra support.

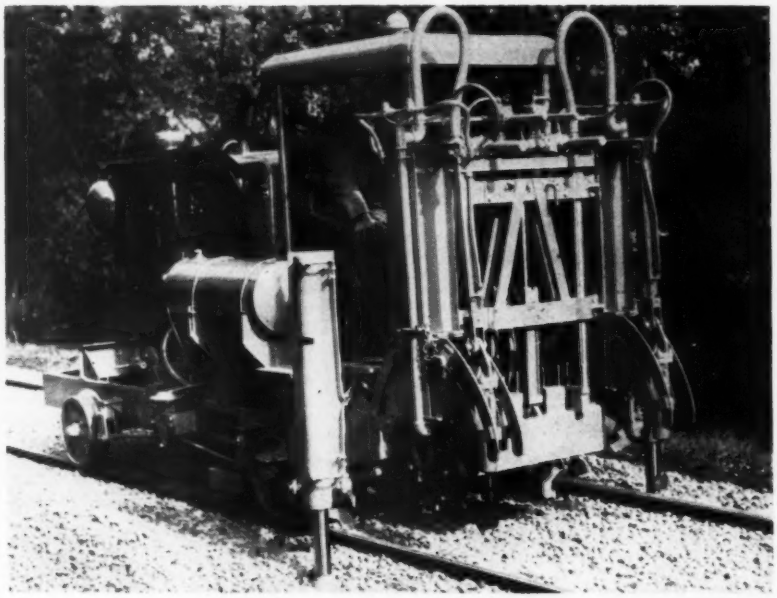
All models that are available in from 2 to 15-gal sizes are fully corrugated for greater impact and damage resistance, have solid brass nickel-plated spigots, and the insets have rounded bottoms for cleanliness. *Schlueter Manufacturing Company, Dept. RTS, 4616 N. Broadway, St. Louis 7, Mo.*

Transistorized power for . . .

Two-way mobile radio

THE MOST POWERFUL two-way mobile radio now available is the claim for a unit having a fully transistorized power supply. It is a 100-watt model that represents an expansion of the "T-Power" radio line which now includes 60-watt radiophones in the 144-174 mc band and 50 and 100-watt units in the 25-54 mc band. Four transistors are used in the 100-watt radio to replace both the vibrator and dynamotor.

The transistorization of the power supply has reduced the size and weight of the 50-watt low-frequency unit, enabling it to be mounted in a 10-in-wide housing that can either be dash or trunk-mounted. Formerly this type radio was available only in the trunk-mounted 15-in-wide housing. Similarly, its weight has been reduced 36 per cent—from 74 to 47 lb. *Motorola Communications & Electronics, Inc., Dept. RTS, 4501 W. Augusta Blvd., Chicago 51, Ill.*



No over-raising with . . .

New tamping jack

UNEVEN SETTLING of the track, caused by over-raising, is said to be avoided by the use of a new machine designated the McWilliams Jack Tamper. It is claimed that ballast compaction by this unit is sufficient to hold grade for even the heaviest production tamping machine. Tamping is accomplished by four heavy-duty tamping tools, mounted two on each side of the tie. Only a machine operator and a man to sight the raise are needed. The machine is spotted, clamped to the rails, jacks lowered to raise the track, an integral level used for accurate cross level, and the tie is tamped. *Railway Maintenance Corporation, Dept. RTS, Box 1888, Pittsburgh 30, Pa.*

Better bond with . . .

New concrete admixture

TWICE the bonding strength of the best available latex materials is claimed for a new type of resin emulsion when used as a replacement for water in mixing concrete. Designated 43-114 Plastic Dispersant, the new emulsion also is used for bonding new concrete to old concrete, brick, stone, steel or wood. When used as a replacement for water in a concrete mix, 43-114 is said to impart to the mix seven times as much load-bearing strength and four times as much resistance to the abrasion of trucking.

Concrete made with 43-114 has excellent workability with a low water/cement ratio of 0.42, according to the manufacturer. Other advantages claimed are that it is self-curing, non-shrinking, and may be installed from a featheredge to any desired thickness. Also, it accelerates curing so floor areas may be opened to pedestrian traffic in from 8 to 12 hr and to normal trucking in from 18 to 24 hr; it is self bonding to any clean wet or dry surface; it is waterproof; and it is resistant to oil, gasoline, other solvents and most alkalis or acids. *Acorn Paint & Chemical Co., Dept. RTS 8001 Franklin Blvd., Cleveland 2, Ohio.*

Because heavy traffic was a problem, this USS Quality Trackwork was heat-treated to increase hardness and toughness

THIS CROSSING is subject to continual pounding from heavy-duty freight and high-speed passenger traffic. In the four years since its installation, there has been a noticeable reduction in maintenance costs at this location.

Heat treatment of the rails gets part of the credit. Full heat treatment not only increases hardness, and therefore resistance to wear; it also increases strength, toughness and resistance to impact. The important element in production methods developed by United States Steel to assure you of quality trackwork is *control* . . . not only of the critical heat-treating operation, but of all stages of production. Accurate control of all stages of production is possible because United States Steel is a completely integrated manufacturer of railroad trackwork.

For complete data, photographs and diagrams on the full line of USS Trackwork products, send for our free catalog, "USS Trackwork." Address your request to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Our engineers will be glad to advise on trackwork planning at any time.

United States Steel Corporation, Pittsburgh
Columbia-Geneva Steel Division, San Francisco
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United States Steel Export Company

USS United States Steel

Restore visibility to blind crossings with a new "crew"...

Dow Brush and Weed Killers

Danger and delay lurk all along your right-of-ways wherever brush and weeds hide crossings, interfere with signals and switches or invade ballast and berm.

That's why modern lines are eliminating the hazards and expense of brush and weeds with the new "crew" of

Dow brush and weed killers.

These specialized Dow vegetation control chemicals do a better job for less because they're tailor-made for specific brush and weed problems. Veon* 100, a new brush killer, provides control of hardwood brush and mixed weeds. Radapon* wipes out tough grasses like Bermuda. Baron*, a semi-soil sterilant, controls both grass and weeds for extended periods.

These and other Dow brush and weed control chemicals clear the way at lowest cost when they're applied by a professional applicator. His experience with chemicals, his trained personnel and specialized on-track equipment actually save you money . . . all along the line.

*TRADEMARK OF THE DOW CHEMICAL COMPANY

Get the complete story. The new Dow book, "Special Report to Railroads", will show you dramatic proof of why the Dow "crew" of brush and weed killers are a must for modern railroading. Write for your free copy today. THE DOW CHEMICAL COMPANY, Agricultural Chemical Sales Dept., Midland, Michigan.

YOU CAN DEPEND ON DOW

RAILWAY TRACK and STRUCTURES

What's the answer?

To be answered in August

Do you have an answer to any of the questions listed below? If so, send it in. Payment—based upon substance and length—will be made for each published answer. If you'd prefer that your name be withheld, we'll gladly comply.

DEADLINE: June 30

1. What are the advantages, if any, in moving roadway signs out of the way of track equipment by placing them on the nearest telephone poles? What signs can be moved? Explain.

2. How far apart should fire breaks be spaced on long timber trestles? How should they be constructed and of what materials?

3. Under what conditions is it desirable and economical to install heat-treated rails in running track? Alloy steel rails? Explain.

4. In buildings constructed of concrete blocks what problems are encountered due to condensation of moisture on the interior wall surfaces? What measures can be taken to overcome these problems? Explain.

5. Under what conditions is it desirable to use strainers in pipe lines ahead of pumps? What determines the mesh size of the strainer basket and also the need for cleaning.

Send answers to:

What's the Answer Editor
Railway Track & Structures
79 West Monroe Street
Chicago 3, Illinois

Do you have a question you'd like to have answered in these columns? If so, please send it in.

Maintaining outlying stations

Where both passenger and lcl business has declined to a very low point, what steps can be taken to reduce maintenance of the station? Should the existing building be perpetuated or should it be replaced with some other type of structure? Explain.

Several considerations

By W. F. ARMSTRONG
Engineer of Buildings
Chicago & North Western
Chicago, Ill.

To reduce maintenance on stations where passenger and lcl business has declined to a very low point it is preferable to reduce the size of the structure. However, remodeling, or a new structure, may require a sizable expenditure. Until money is available, the following may be considered:

(1) Defer maintenance, looking forward to eventual remodeling or replacement of the structure.

(2) Close off a portion of the building.

(3) Lease a portion of the building.

(4) Consolidate existing separate freight and passenger facilities into one building, and retire or lease vacant building.

Whether the existing building should be perpetuated or replaced should be determined for each individual building. It should be examined for its physical condition and to determine how it might lend itself to economical remodeling for both present and future requirements.

In cases where the existing structure is of frame construction, too large, and in poor condition, it is more economical to retire the existing building and construct a new one. Usually these new stations will contain a small waiting room, toilets, office and freightroom, and might not be any larger than 16 ft by 32 ft. Where passenger service has been eliminated, no waiting room would be required. In some locations two toilets would be necessary to meet code requirements.

In the case of structures that are in good physical condition, and the floor plan is such that it could be easily altered for present and future requirements, it is generally more economical to remodel the existing structure than to construct a new one.

Reduce in size

By W. H. BUNGE
Assistant Engineer
Missouri Pacific
St. Louis, Mo.

Providing the station building has a wood frame and is in sound condition, it may be greatly reduced in size and the exterior walls covered with asbestos siding. It may be practical and economical to cut off a portion of the freight wareroom and in some cases reduce the size of the passenger waiting rooms. Asbestos siding requires no painting and thus reduces maintenance. Lcl freight usually is delivered on arrival and therefore large warerooms are no longer required.

Where the existing station building is badly deteriorated, it is probably more economical to remove the structure and replace it with a new building. Prefab steel buildings have been found to be very satisfactory. They are available in many sizes, types of roof structures, and varieties of doors and windows to suit the requirements of the purchaser. Prefab concrete buildings have also been used by some railroads.

Masonry buildings are not so adaptable to alteration, although in some cases about half of the structure may be removed. This cuts down the roof area and reduces the number of window and door open-

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ORTON cranes have long been famous for durability; ORTON steam cranes are still in use; ORTON users are reluctant to part with rugged, easy-to-maintain ORTON work horses.

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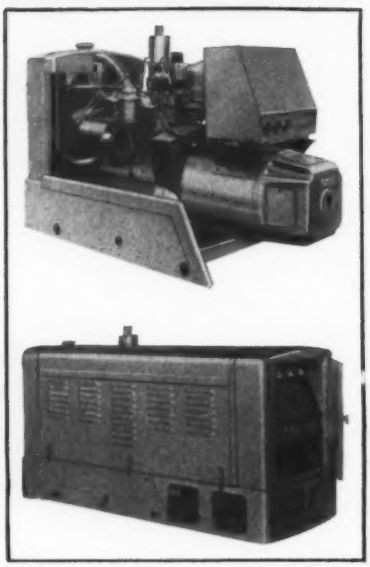

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Water-cooled units in 10 and 15 KW sizes meet rigid requirements

A new series of water-cooled electric plants makes Onan reliability and advantages available at significantly lower prices. The new units are powered by the same rugged, industrial-type engines used on more expensive plants. They have close inherent voltage regulation, operate on either gas or gasoline, and are equipped with all necessary controls and instruments, and high water temperature cut-off. Standard Onan accessories are available.

The Onan revolving armature, all-climate generator is direct-connected and self-aligning. All standard voltages are available. Both sizes are offered unhoused or with handsome weatherproof steel housings.

Write for specifications

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3704A University Avenue S.E.
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What's the answer? (cont'd)

ings, thereby reducing maintenance.

The office should be carefully considered as to size and arrangement so it will be functional and neat in appearance. Storage space for stationery and station records may be provided in built-in counters or cabinets. Good housekeeping is also necessary to keep an office attractive.

Use a metal building

By H. A. MATTHEWS
General Foreman B & B
Frisco
Amory, Miss.

In the smaller towns where both passenger and LCL business has declined, we remove the large structure and replace it with a metal building. We usually place the agent-operator office in the center with a small projection for bay window and with a small passenger room at one end and a small freightroom at the other.

We have segregated passenger stations here, so we divide the passenger room by a high-back seat, which places colored people on one side and the white passengers on the other in the same room. A counter separates the office from the passenger room.

The size of the depot is dictated by the amount of business expected. At the larger stations where the building is in a good state of repair, we usually consolidate both colored and white passengers with the same arrangement used in the smaller stations and then retire the portion not needed when time permits.

Disposing of oil-water at terminals

What are the best methods of disposing of wasted fuel and lubricating oil mixed with water at diesel locomotive terminals? Explain.

Can re-refine it

By R. A. BARDWELL
Engineer of Tests
Chicago & Eastern Illinois
Danville, Ill.

This question is necessarily divided into two parts, due to the comparative values of fuel vs lubricating oil. Since the latter, when new, is five times the value of fuel oil, it is given primary consideration.

Lubricating oil from diesel crankcases, when segregated, can be partially separated from water contamination by settling. Not all of the water contaminant will separate, especially when drained from a working engine having a serious water leak. Some will remain emulsified, due to soap-like action of the heavy-duty additives present. However, after all possible free water is drained from an elevated storage or a loaded tank car, or pumped from above the water level in an underground storage, the dirty oil is best sent to a commercial re-refiner or subjected to processing by the railroad, if such facilities are available.

In such processing, acid treatment, followed by steam washing and distillation of free water and pressure filtration, will remove water, oxidation products and other contaminants, including fuel oil, to leave an additive-free mineral oil. If desired, this oil can be refortified with a heavy-duty additive content, so that it may be reused the same as new lubricating oil. This is the greatest economical use of such oil.

Considering the value of new crankcase oil at 55 cents per gallon (including tax), the re-refined oil is returned to the railroad stock for similar use at a total cost (no tax) of about 24 to 28 cents per gallon. As only 70 to 75 per cent of dirty oil is usually reclaimed, the rest being removed as water, sludge, fuel oil, etc., the value of such dirty oil will average about 23 to 25 cents per gallon.

Used diesel-lubricating oil, when separated from contaminants, may also be converted into car-oil lubricant by blending the cleaned oil with a lighter oil in order to meet specifications. The value of the waste oil reclaimed by this method is no greater than that reclaimed for crankcase lubrication use, but the cost of blend-

Positioner holds anchor firmly against tie while mechanical hammer installs it accurately with a sledge-like blow. Special stop prevents overdriving.

Mechanical driver and Bulldog anchors give you

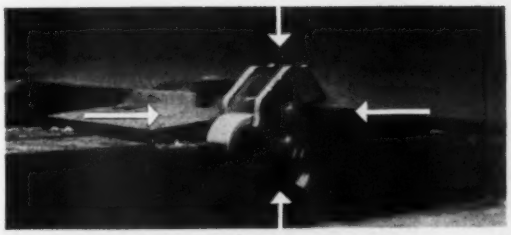
ALL THE HOLDING POWER YOU'RE PAYING FOR

True Temper's new mechanical anchor driver makes sure you get full benefit of the BULLDOG anchor's tremendous holding power.

Essentially a mechanized sledge hammer, the new driver weighs only 425 pounds. It positions each anchor snugly against the tie, then installs it quickly and uniformly to give you all the holding power you're paying for.

Because of its one-man operation, light weight and retractable setoff wheels, the mechanical driver is a fast, flexible, cost-cutting machine. Its speed and simplicity made it a top favorite at the National Railway Appliances Exhibition in Chicago.

Be sure you get the full story on BULLDOG rail anchors and machine application as pioneered by True Temper. Contact your True Temper representative, or write True Temper, Railway Appliances Division, 1623 Euclid Avenue, Cleveland 15, Ohio.



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TRUE TEMPER® BULLDOG RAIL ANCHORS YOU CAN LOOK TO TT FOR LEADERSHIP

ing and control makes the savings much less.

Either lubricating oil or fuel oil, after removal of excess water by settling, may be used for firing stationary boilers. Fuel oil thus partially cleaned of water, where it may contain too much contaminant for critical diesel use, has been put to use in blacksmith forging furnaces, etc.

There is one way in which water-contaminated fuel and lubricating oil may be disposed of with no considerable value to the railroad. That is by using it to spray dirt roads during a dry spell to lay the dust.

The last resort of disposal of wasted fuel and lubricating oil mixed with water is to store such contaminated products either in tanks, or even earthen reservoirs, until the amount collected is sufficient to warrant a scavenger oil truck to pick it up at no cost. Such oil may be that skimmed or removed from oil separators before entering sewage disposal systems. If oil in sufficient and steady amounts is available, under competitive circumstances, there may even be some compensation realized for it from the scavengers.

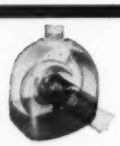
There are several methods of disposal which are not recommended. The waste oil should not be allowed to enter city sewage systems to cause trouble at disposal plants, nor should it be allowed in water run-off areas where it could enter and contaminate streams. Waste water and oil from spillage should not be excessive enough to seep into the ground. (In one case such spillage and underground intrusion carried some oil into a nearby basement.) Burning of collected waste oil in the open is frowned upon, if not completely banned, by most communities and some states, as a smoke nuisance.

These portable pumps prime at 30 feet lift!

These rugged new pumps prime and reprime at lifts up to 30 feet. Move easily because of light in weight aluminum construction.

Four models:

Midget	1½"	6,500 GPH	2.25 HP
Pelican	2"	8,500 GPH	2.75 HP
Hawk	2"	12,000 GPH	5.5 HP
Eagle	3"	18,000 GPH	6.8 HP



Pump at rest—Captured liquid retained for priming. Note no check valve.

Priming action—Entrained air (B) escapes at (A) to be discharged. Priming liquid returns (C) to entrain more air.

Pumping action—Straight-in suction voids entrance restrictions. Water enters direct to eye of impeller. Sediment is purged.

THE GORMAN-RUPP COMPANY
305 Bowman Street, Mansfield, Ohio

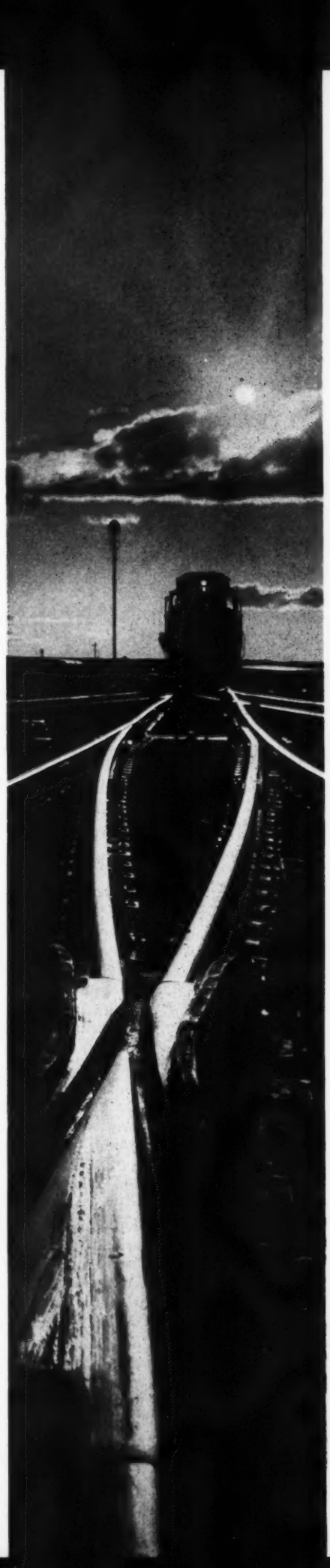
Install oil collector

By D. C. TEAL
Superintendent Water Supply
Chesapeake & Ohio
Richmond, Va.

Spilled fuel oil at diesel fueling areas is usually not emulsified with the water nor contaminated with other materials and can be salvaged. I believe the best method is to provide a concrete platform with underground drainage arrangement at diesel fueling areas that will collect and direct the spilled fuel oil and water into a gravity oil-separator. The salvaged oil can then be pumped back into the fuel-oil storage tanks or, as has been done in several cases, pumped through a filter direct to the diesel locomotive fuel tank. We have four such installations on our railroad. When first installed they recovered a surprisingly large amount of oil, several hundred gallons weekly at each location. The local people in charge are now paying more attention to the mechanics of the fueling operation and have reduced this waste considerably.

Where spilled fuel and lube oil and other oily wastes have become emulsified with the water, usually by action of detergents and cleaners used at engine washing platforms, etc., the process of separation is complicated and salvage is often not feasible. The oil cannot be removed by gravity separation until the emulsion is "brok-

Working all
the shifts...



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In back of this safety and reliability are 75 years of Racor experience in researching, designing and building trackwork and specialties. Seven Racor plants are strategically located to provide fast delivery service at low cost. Here at your command is a wealth of engineering experience. Why not consult your nearest Brake Shoe representative before you begin your next trackwork installation?

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Here's a new materials handling idea railroads are taking to fast. So versatile is the BANTAM self-propelled as an all-purpose machine that it's just like having the services of *many* different rigs—but at one very-low-cost investment.

The BANTAM CR-35 has just one engine for travel and work. It's one-man operated, with no-shift forward-reverse. It's compactly sized to maneuver in tight areas and work in crowded yards efficiently. And it works and travels independently—simultaneously!

The materials handling scope of the BANTAM CR-35 is almost unlimited. The way it will busy itself around the yard or out on the right-of-way will chalk up amazing savings for you. Use it for car loading and unloading . . . stockpiling . . . sorting . . . transporting . . . erecting . . . handling bulk materials . . . driving pile. Then, with fast-change BANTAM attachments, you're equipped for shovel, back hoe, dragline, magnet crane and other important services.

The BANTAM CR-35 has all the big-rig features at a cost actually thousands of dollars under similar equipment: all-weather, all-vision cab . . . 7-ton capacity . . . power-up and power-controlled boom lowering for safe, precise "inching" of loads . . . simple, "cold-proof" positive mechanical controls . . . anti-friction bearings throughout . . . and much more!

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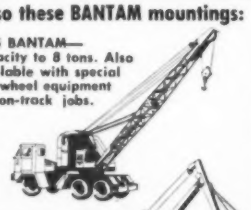
Also these BANTAM mountings:

T-35 BANTAM—capacity to 8 tons. Also available with special rail wheel equipment for on-track jobs.



C-35 BANTAM on crawlers.

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What's the answer? (cont'd)

en" by chemical treatment which requires special facilities and control. I believe it best, when local conditions permit, to lagoon this type of waste materials and burn off the oily portion by setting fire to the surface of the lagoon at weekly or semi-weekly intervals. We have one installation of this kind and its operation over a three-year period has been quite satisfactory.

Stone ballast sizes

What size stone or slag ballast is most suitable for heavy-duty high-speed track? Do the light raises now being made with on-track power equipment have a bearing on this question? Explain.

Trend to smaller stone

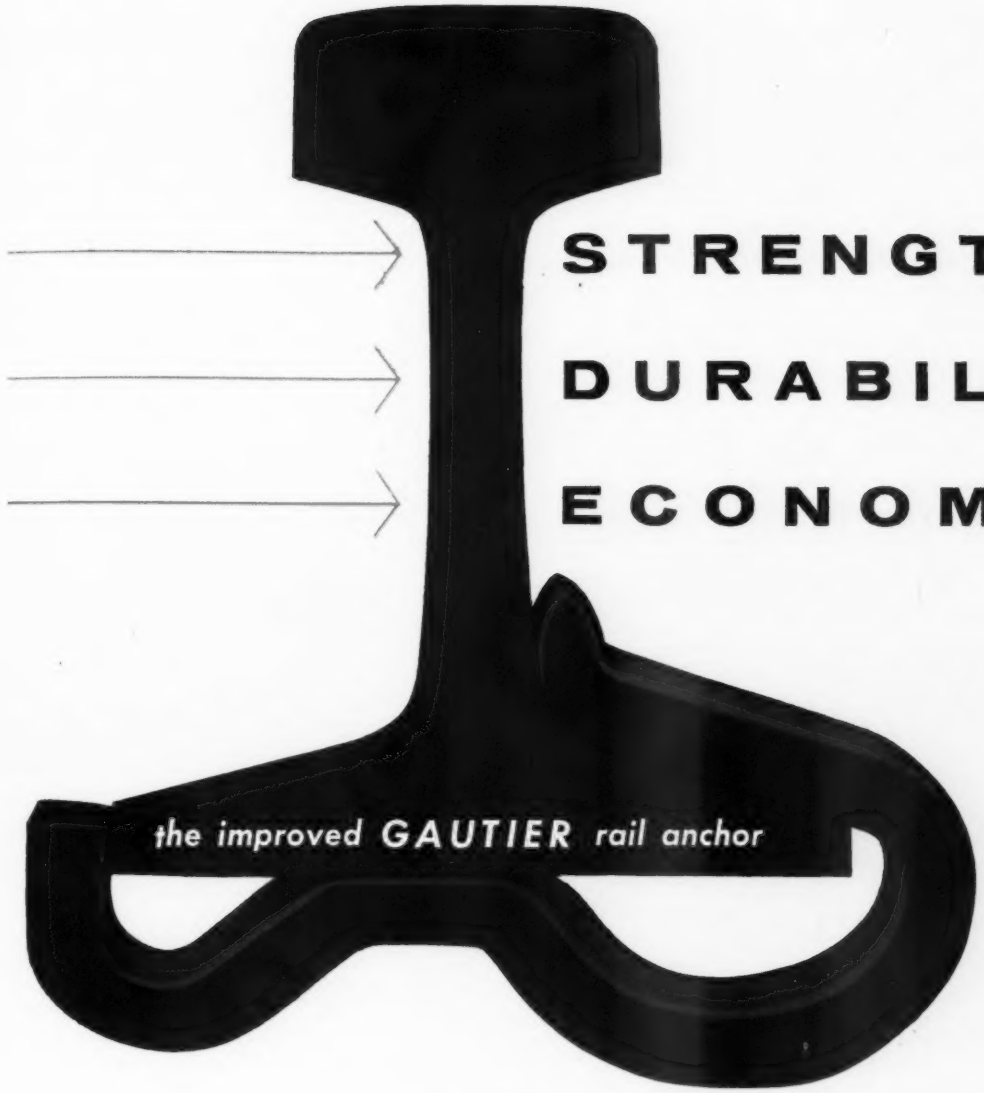
By Track Supervisor

You will no doubt receive answers from different men who will each state positively that a certain size stone or slag they are using is the best. And the sizes mentioned will be different. This will not be surprising because past experience by many Class I roads definitely proves that stone and slag ballast having a maximum size ranging all the way from 3 in to 1 in have been used successfully for high-sped track. So, in a way, all your correspondents will be right.

The last half of your question infers that a change in the size of the stone has taken place because of the use of on-track power equipment. And, I think that is right. The trend now is toward the smaller sizes.

Before the general use of production tampers, track raises of from 5 to 7 in were common. The large-size stone used for these raises flowed freely in the cavities under the ties where it could be firmly packed. Smaller raises did not permit this. The larger stones were used because many believed that they retained good surface for a longer time than the smaller sizes.

While making these high raises, the larger stones were handled for the



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What's the answer? (cont'd)

most part by men using air-tamping guns powered by large compressors. However, with each man exercising his own tamping motions and number of insertions of the tools, the track was not uniformly tamped. Hence, spotting generally followed closely behing the out-of-face raise. This work was more difficult because only small exacting raises were involved and the work was done either by fork tamping or by small outfits with hand-held guns. Either way it was slow exacting work to make the slight raises with the large-sized stones. Also, the spot tamping was never-ending and increased until the next out-of-face surfacing project.

The advent of the production-type tampers changed this. These machines soon demontsrated their ability to tamp ties faster than previous methods, and with greater uniformity. They performed successfully both on track ballasted with large-size stone and that having the smaller sizes. Soon they were used by some roads to tighten ties in track which had previously been given an out-of-face raising and surfacing. Then they were used for 1½-in track raises.

The increased use of the production-type tampers and their ability to tamp the lighter track lifts have enabled the railroads to schedule more of the lighter surfacing work. This practice has eliminated much of the spot-tamping formerly done by the section forces between cycles of out-of-face surfacing.

The lower raises are having an effect on the size of the stone and slag ballast. Obviously, it is more difficult to make a 1½-in raise when using 2½-in stone than it is with 1½-in stone. So there is a definite trend toward using the smaller sizes. The recent report of the AREA Committee on Roadway & Ballast verifies this. It shows that the No. 4 stone ballast, ranging from ¾ in to 1½-in, is the size most widely used. A report made by this same committee in 1944 showed that more roads were then using the larger sizes.

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Challenging need for dolphins

Is the need for dolphins or protective pile clusters at bridges ever challenged when they show need for replacement? What factors determine their perpetuation?

Depends on record

L. P. DREW
Assistant Chief Engineer
Union Pacific
Omaha, Neb.

Dolphins, protective pile clusters or fender piles are usually driven to protect drawspans or other movable bridges from damage by being struck by boats or other crafts in the waterway.

If the hazards of navigation on the river or watercourse are such as to require installation of these protective piling at the time of construction, there should be no challenge to their replacement as and when required unless the conditions of navigation have radically changed.

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What's the answer? (cont'd)

On the other hand if these protective pilings have been in place for many years without damage the need for their replacement or continuance in service could be questioned.

Not all bridges over navigable stream or waterways require pile-fender or dolphin protection. The type and frequency of water-borne traffic will of course be the governing factors.

It is best to consider such protection at the time of construction. The damage which could be done to a bridge when struck by water-borne craft might well exceed the cost of such protection.

Their continuance in service will of course depend upon the experience record following original construction.

Saving by using SH ties

Considering the high cost of labor, is there a long-range saving derived from the use of reclaimed ties in side tracks? Branches? Give consideration, in answer, to the price that would be obtained from the sale of reclaimed ties.

Goes into economics

By F. M. SCHILT
Assistant Division Engineer
Baltimore & Ohio
Grafton, W. Va.

The question first of all deals with certain assumptions based upon the life of a tie in track. I assume the average life of a treated tie to be 30 years. A new main-track tie costs about $4.00 each. A branch-line tie costs about $3.00 per tie. A second-hand tie having 10 years or more life can be sold for about $0.50 per tie. Ties having over 10 years of life can be sold for $1.00 per tie.

The labor cost to install each tie will run between $1.00 and $1.50 per tie, depending upon the method used for installation. For discussion purposes I will use the figure of $1.35 per tie for the cost of installation. If a tie is going to be reused its cost will then become $2.70 per tie.

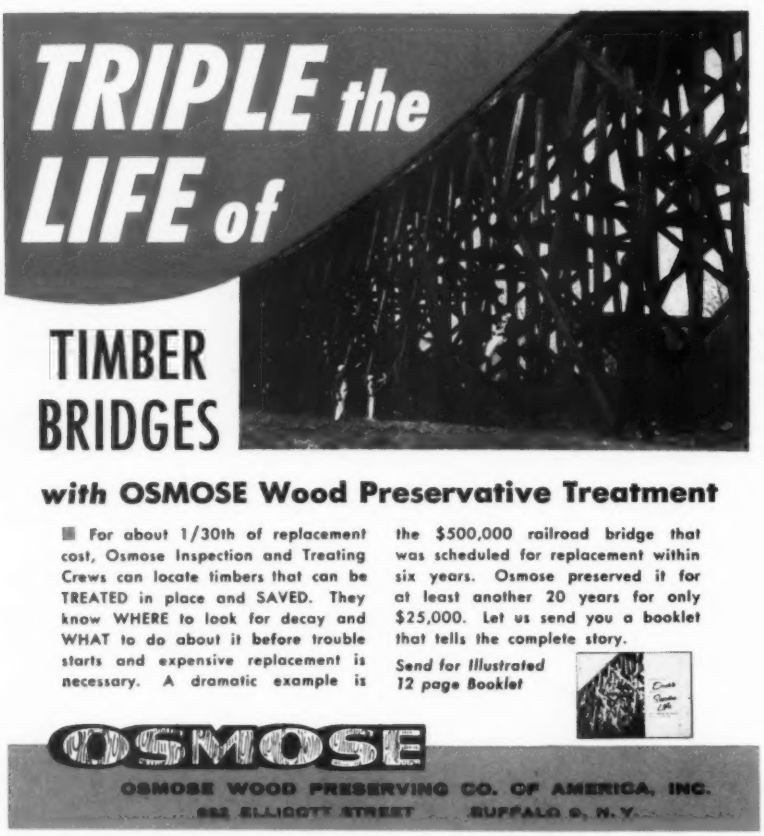
Now let us take a hypothetical case of a railroad retiring one mile of main track containing 3,000 ties with a tie renewal of 100 ties over the 30-year period. There will be 1,000 ties having 30 to 21 years of life remaining. One thousand ties will have between 20 to 11 years' life remaining and 1,000 ties with 10 years to one year of life.

Examining these groups we find that, exclusive of any handling charge, a tie having a life of 10 years has a salvage value of $0.50. We must add the cost of installation of $1.35, making a total cost of $1.85 per tie for a life of 10 years.

It follows that this would have to be done three times to make up the life of a new tie installed and, therefore, costing $5.55. A new side track tie can be installed to last 30 years for a cost of $3.00 for the tie and $1.35 for the labor, or $4.35. Therefore, a saving of $1.20 can be realized by installing a new tie having 30 years of life over installing three secondhand ties in the same location, each having 10 years life. I, therefore, feel that ties having this life should be sold, if possible, or destroyed.

A tie having a life of 20 years has a salvage value of $1.00 per tie and an installation cost of $1.35, making a total cost of $2.35 per tie. This tie will have to be installed three times to give a life of 60 years. The total cost would be $7.05. Two new ties of the branch line variety at $4.35 each would have to be installed to give the same 60 years of life. This cost would be $8.70. So the two reused ties would produce a saving of $1.65 in 60 years.

As you can see, this is a marginal point and I would recommend sale if the market were available. If not, these ties should be reused. Basically, it would appear on the same cost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. . . mechanical work horse for propelling the DUN-RITE® Gaging Machine and Pregager

The Dun-Rite BRONCO, Nordberg's newest money-saving *"Mechanical Muscle,"* is now available to all users of Dun-Rite Gaging equipment. Without the BRONCO, one man pushes the Pregager and a minimum of two men push the Dun-Rite . . . the BRONCO, manned by one operator, replaces these three men . . . stepping up the speed and efficiency of the entire gaging operation.

A uniquely designed single tread crawler tractor, the "Bronco" rides on the tie ends just outside the rail in track. It can be easily used with all Dun-Rite Gaging Machines now in service.

For complete details on this latest Nordberg time and money saving machine, mail the coupon today.

NORDBERG MFG. CO., Milwaukee, Wisconsin

MAIL COUPON TODAY

Nordberg Mfg. Co., Milwaukee, Wis. RT
Send copy of the new "Bronco" Bulletin 269 to:

Name_____

Railroad_____

Address_____

City_____ Zone____ State_____

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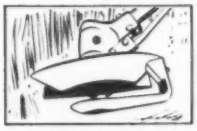
ROWCO
BRUSHKING®

Rowco's portable power driven brushcutter is designed for rugged terrain . . . cleans out brush up to 4" in diameter at ground level. Safe, dependable . . . Rowco's BRUSHKING is a real worksaver. Write today for name of your distributor — Thousands in use. Literature for your asking.



Grass Trimming attachment

ROWCO
MFG. CO., Inc.
108 EMERALD STREET
KEENE, NEW HAMPSHIRE
A subsidiary of Harrington & Richardson, Inc.
ESTABLISHED 1871

Please send complete information on the Rowco Brushking.

Name_____
Street & No._____
City & State_____

What's the answer? (cont'd)

basis that the limit for this marginal usage would drop to a life of 15 years, since two renewals of the secondhand tie would cost $4.70 against one renewal of a new tie at a cost of $4.35, or a loss of $.70 in 60 years.

Any tie having over 20 years of life most certainly should be reused in branch lines as there would definitely be an overall savings from the use of these ties.

From the preceding analysis it is concluded that out of our hypothetical mile of main track to be removed, 1,000 cross ties in the 30 to 21 year life bracket should be salvaged; 600 ties in the 20 to 15 year life bracket should be sold, if possible, or used if not sold. The remaining 1,400 ties should be sold if the market is available, or destroyed, as they are too costly to salvage.

For special locations

By J. H. KRAEMER
Roadmaster
Chicago, Rock Island & Pacific
Manly, Iowa

In my opinion there is a long-range saving derived from the use of reclaimed ties on branch lines and side tracks. This is on the basis that the expected life of the ties to be used is at least 10 years and that they are used where conditions warrant renewals at lower than normal cost.

I would recommend the use of reclaimed ties in connection with undertrack sled surfacing or other modern surfacing operations, especially where renewals run heavy, if mixed with at least 50 per cent new ties.

The same would apply to tie renewals in side tracks where ties are renewed in connection with surfacing.

I would not recommend the use of reclaimed ties under joints, in crossings, through station platforms, in repair tracks, or at locations where it is desired to disturb tracks as little as possible, or where renewal costs are abnormally high.

I would not recommend the use of reclaimed ties on high-speed lines on account of the more rapid deterioration of the ties on such lines.

Biographical briefs (cont'd)

(*Continued from page* 10)

man, rodman and assistant engineer on the construction of a new line in Wyoming. Later he served as assistant engineer maintenance of way for the Burlington at Denver, Colo. From 1911 to 1915, Mr. Tinkler was engaged on the construction of several new railroad lines. Thereafter he served with various contractors until May 1921 when he entered the service of the Southern Pacific as assistant engineer maintenance of way. He subsequently served as assistant engineer valuation, office engineer valuation, valuation engineer and valuation officer, the position he held at the time of his recent retirement.

John N. Cotinich, 31, who was recently appointed senior assistant division engineer on the Southern Pacific at San Francisco (*RT&S*, Jan., p. 10), graduated from the University of California with a B.S. degree in civil engineering. He began his railroad career with the SP in 1951, working in various clerical engineering capacities on the Sacramento division until 1953 when he was named general foreman on that division. In 1955 he was promoted to assistant division engineer on the Portland division, and the following year he served in that capacity on the Yuma division. In November 1956 he was named senior assistant division engineer on the Los Angeles division, where

RAIL AND TRACK EQUIPMENT

You can get everything you need for industrial track and crane runways —with one call to your nearest Foster office. Immediate deliveries from the nation's largest warehouser of rails (both new and relaying), switch material, and track accessories. Send for free catalogs and ordering guides.

Complete Contractor Service—Since 1901

L. B. FOSTER CO.

PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
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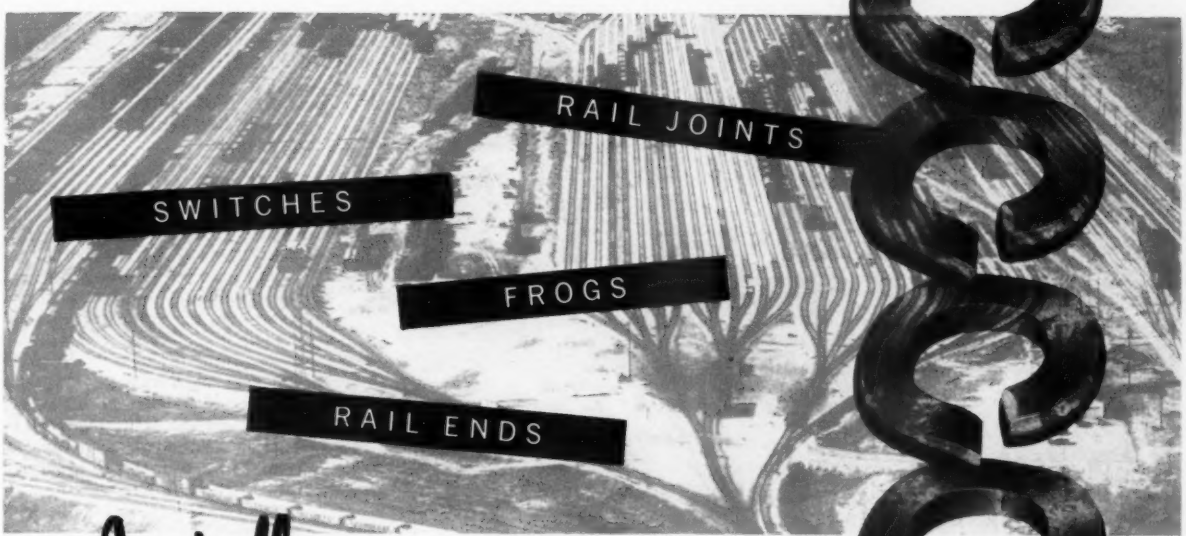
For System-wide Protection at these vital points!



Install— NATIONAL RAILWAY SPRING LOCK WASHERS

NATIONAL Railway Spring Washers are designed to keep bolts tighter by maintaining constant bolt tension, absorbing shocks and protecting rail ends. They withstand the extreme stresses and strains of continuous, heavy traffic... reduce maintenance costs system-wide!

Serving Industry Since 1886

THE NATIONAL LOCK WASHER COMPANY — NEWARK 5, NEW JERSEY, U.S.A.

A Complete Line of Railway Spring Washers

HUBER-WARCO
motor graders

helps keep traffic running on time

Modern railroads have turned to the use of off-the-track, rubber-mounted equipment for right-of-way maintenance. There is no longer a need to hold up trains, or lose important work-crew man hours while track-mounted equipment is moved to a sometimes distant siding. Huber-Warco MOTOR GRADERS fit right into this new approach. While the Huber-Warco grader performs the necessary grading jobs, trains roll by without delay. An outstanding feature of the Huber-Warco GRADERS is the hydraulic cab-controlled blade movement for bank sloping. In less than a minute, and **without** ever leaving the cab and **without** manual adjustments, the operator can change the blade from 90° on one side to 90° on the other. This is just one of the many PLUS features. See your Huber-Warco distributor for details on the complete line of torque converter and standard transmission MOTOR GRADERS ranging from 75 to 195 h.p.

A product of HUBER-WARCO COMPANY, Marion, Ohio, U. S. A.

HUBER-WARCO COMPANY, Marion, Ohio, U.S.A.

☐ Send me specifications on the Huber-Warco Motor Grader line.

☐ Send me the name of my nearest Huber-Warco distributor.

Name _____

Title _____

Company _____

Address _____

City _____ Zone ____ State _____

5-RT

HUBER W WARCO

Biographical briefs (cont'd)

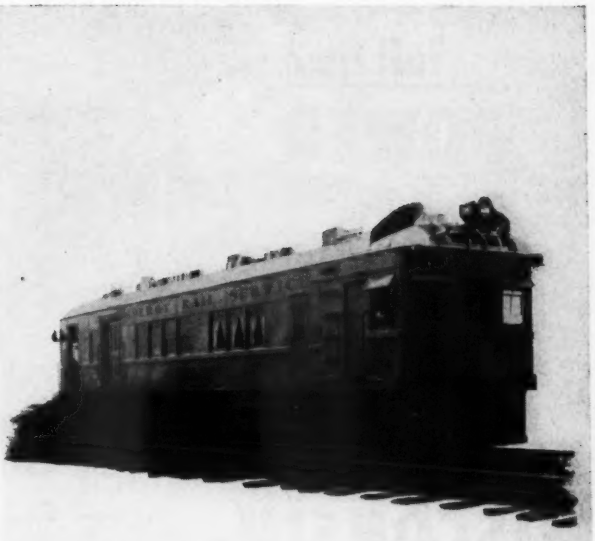
he remained until his recent transfer to San Francisco.

Charles E. Defendorf, 45, who was recently promoted to chief engineer of the New York Central at New York (*RT&S*, March, p. 10), graduated with a B.A. degree in civil engineering from Brooklyn Polytechnic Institute and entered railroad service with the NYC in February 1936 as a designer and detailer at New York. In November 1945 he was named assistant engineer at Detroit, Mich. He was promoted to assistant engineer buildings at Chicago in October 1947 and was appointed engineer of buildings at that location in March 1954. Mr. Defendorf served in that capacity until January 1956 when he was named assistant chief engineer at Chicago —the position he held at the time of his recent promotion.

James Lee McBride, 39, who was recently appointed principal assistant engineer of the Seaboard Air Line at Norfolk, Va. (*RT&S*, Feb., p. 10) graduated from The Citadel with a B.S. degree in civil engineering and entered railroad service in June 1939 as an apprentice section foreman at Franklinton, N. C. In October 1939 he was promoted to assistant to division engineer at Savannah, Ga., and was transferred to Raleigh, N. C., in November 1941. In the following year he was appointed assistant division engineer at Raleigh, being transferred to Savannah in May 1942. He left railroad service in October 1943 for active duty with the U. S. Army's 722nd railway operating battalion. In April 1946 he returned to the Seaboard at Savannah in his former capacity of assistant division engineer. In November 1948 he was named principal assistant division engineer at that location.

Roy H. Menary, 39, who was recently appointed division engineer of the Toronto Terminals division of the Canadian National at Toronto, Ont. (*RT&S*, Mar., p. 10), attended Central Collegiate Institute and Queens University. He began railroading in April 1944 as an instrumentman for the Canadian National at Bellevue, Ont. In May 1948 he was named assistant division engineer at London, Ont., and was transferred to Bellevue in May 1950. Later that year he was promoted to division engineer at Hornepayne, Ont., and was transferred to Allandale, Ont., in May 1955. From August 1956 until December 1957 he served on the Central Region Operation Training Program.

Phillip R. Richards, who was recently appointed assistant division engineer on the Canadian National at Edmundston, N. B., (*RT&S*, Mar., p. 10) graduated from the University of New Brunswick with a B.S. degree in civil engineering and entered railroad service in 1953 with the CNR as an instrumentman at Edmundston. In 1954 he was promoted to junior assistant engineer and in 1956 was named assistant engineer—the position he held at the time of his recent promotion.



30 YEARS OF RAIL TESTING

Detector Car 102 located its first defective rail in 1928. During the 30 years since, Detector Cars of Sperry Rail Service have discovered millions of rail defects; helped America's railroads to set safety records unequaled by any other form of transportation.

The modern, highly efficient Sperry Detector Car of today is a far cry from old 102.

In line with our program of constant research, Sperry Engineering is working on a new rail-testing concept. The year 1958 will bring even greater advances in rail testing.

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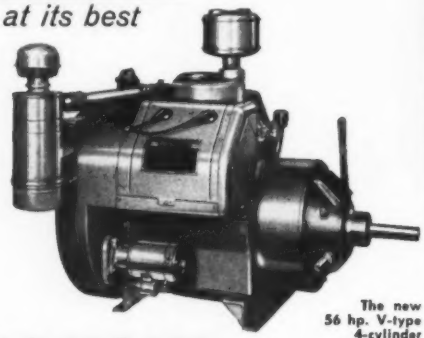
SERVICE

Division of
Sperry Products, Inc.
Danbury, Connecticut

full time

POWER

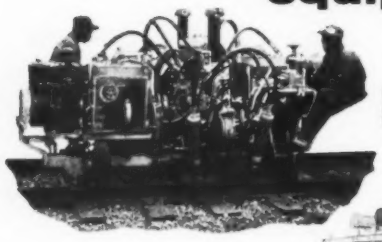
at its best



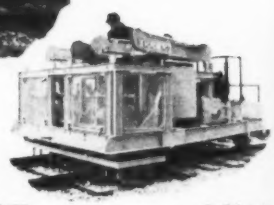
The new 56 hp. V-type 4-cylinder model VR4D.

WISCONSIN-

POWERED equipment



Racine Hydraulics & Machinery, Inc., Racine, Wis., builds it.



Builder is Nordberg Mfg. Co., Milwaukee, Wis.

High speed quality tamping calls for heavy-duty unfailing power in abundance. Each of the Wisconsin Heavy-Duty Air Cooled Engines powering these tampers, works Full Time . . . day after day, month after month, with minimum servicing.

While heavy-duty features are responsible for this kind of *workability*, there's a more basic reason for the success of Wisconsin Engines. Long ago, Wisconsin Motor Corporation decided to build only air-cooled engines. No other products were developed that might draw attention from this one single goal. The plan was sound, for from these undiverted skills and know-how has come a line of engines, unmatched in features, unmatched in *full time power delivery* in the 3 to 56 hp. range. *As a result, Wisconsin Engine Power is the number 1 choice in Maintenance-of-way Equipment!*

Write for general bulletin S-223, describing all single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 56 hp. Also, write for bulletin S-207 describing the V-type 4-cylinder 56 hp. VR4D model.

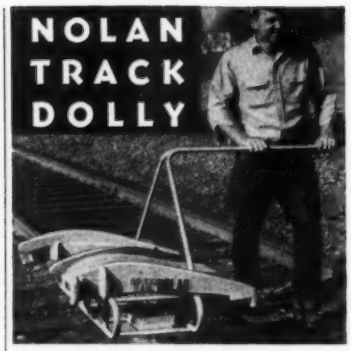
MOST H.P. HOURS

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

NOLAN TRACK DOLLY



. . . the fast, safe, easy way to transport materials

You can get rails, ties, supplies, tools, rerailers, etc., to the job with money-saving speed and efficiency, when you equip your crews with the Nolan Track Dolly.

Built of tubular high-carbon steel. Extremely strong and serviceable. Operator's handle conveniently placed to assure correct balance and full control of heavy loads. Ball bearing cast steel wheels. Convenient spike securely holds dolly in loading position. Deck is heavy mesh expanded steel.

STANDARD DOLLY				INSPECTOR'S DOLLY			
Length	Width	Ht. Above Rail	Weight	Length	Width	Ht. Above Rail	Weight
50½ in.	15½ in.	6⅝ in.	88 lbs.	36 in.	14 in.	6 in.	60 lbs.

NOLAN

NOLAN TOOL AND SUPPLY CAR

2000 lbs. capacity. All-tubular high-carbon steel construction for safe carrying of ties, rails, supplies, etc. Car breaks conveniently in center into two sections for easy handling and transportation. Deck is heavy mesh expanded steel.

Platform size 48" x 45" Ht. above rail 8" Weight 140 lbs. complete.

Write for complete railway supply catalog.

THE NOLAN COMPANY

166 PENNSYLVANIA ST., BOWERSTON, OHIO

MOISTURE-PROOF SEAL WITH

Lewis sealtite

LARGE HEAD CAR BOLTS

Large head Lewis bolts are scientifically designed for tank car running boards—new construction or repair. Bevel under head forms waterproof seal reducing wood rot. Head pulls flush, prevents tripping. Shank and head are forged from one piece of steel for greater strength and true thickness—no need for counter boring. In Galvanized for long time economy or Black for low original cost. All are manufactured in the USA to ASTM specifications.

Ask us how you can save money on Sealtite products.

Section of head showing patented fin design which insures maximum holding power with minimum damage to wood — reduces decay and rust. Available with Lock Tight No. 2 or Std. Sq. nuts.

Lewis BOLT & NUT COMPANY

504 Malcolm Ave. S.E.

MINNEAPOLIS, MINNESOTA

LOOK FOR THIS STAMP OF U QUALITY

TO THE EDITOR

Readers are urged to avail themselves of the opportunity to express themselves concerning the contents of this magazine.

More on equipment buying

TO THE EDITOR:

In the article entitled "What Factors Influence Equipment Buying Today" (*RT&S*, Mar., 1958), the fourth paragraph on page 40 states in part:

"Nor does the railroad have to provide for holidays and vacations for machines."

This statement is correct insofar as it pertains to holiday and vacation pay that would normally be set aside for employees replaced by the machines. But there must also be set aside sufficient funds to keep the machines in operation and in proper repair. In many cases, this offsets the so-called 'fringe benefits' savings to which reference is made.

Since being made responsible for maintenance-of-way equipment on my region, I am aware that it costs money to keep work equipment in operation. I don't think we should leave the impression to the contrary.

A. H. STIMSON
Supervisor M/W
Material & Equipment
Pennsylvania
Buffalo, N. Y.

[*Editor's note—Reader Stimson is right. We certainly do not want to leave any such impression. The point being made in this instance is that, during vacations and holidays, men are paid as if they were doing productive work. However, when a machine is idle (on "vacation"), the expense to the railroad is greatly reduced. In our article the cost of operation and repair factors is given consideration on page 42, both in the text and in the tabulation showing how savings are computed.*]

Association News

American Railway Engineering Association

Only two committees of the association have scheduled meetings to be held in May. The Committee on Roadway and Ballast will meet at the Hotel Cleveland, Cleveland, on May 6 and 7, and the Track committee will meet at the Engineers' Club, Chicago, on May 14.

Two committees have scheduled meetings to be held early in June. The Committee on Highways will meet at Chicago, June 5 and 6, and on the same dates the Committee on Masonry will hold a meeting in the New York Central offices at New York. Committee meetings scheduled to be held later in June will be announced in the June issue.

This maintenance machine is not tied to your tracks

A fast, mobile L-W grader will help keep your right-of-way, yard, and road maintenance up-to-date. It can fix small troubles before they become major problems. Saves time, and the extra expense you'd incur, by postponing for work-train service.

There's no waiting for rail transportation . . . no need for special equipment or crews. One man, operating an Adams†, drives via highway, or on right-of-way, to handle work at various points along your line.

At the job-site, grader can cut and clean ditches, widen embankments, remove brush and weed growth. It can slope banks, level fill, build grade for sidings, spread ballast, grade access roads . . . clean-up around stockpiles, coal docks, shops, yards. Also plows snow, and handles many other jobs.

L-W Adams gives you more work-power

Size-for-size, LeTourneau-Westinghouse Adams graders provide more gear ratios and higher speeds than other graders. With more combinations of power and speed, your operator can always grade at, or near, full rpm engine power . . . can save extra time when backing-up, traveling and maneuvering.

Heavy-duty 80 to 160-hp L-W graders provide 15 full-power speeds to 26 mph . . . 8 forward, 4 reverse, 3 (optional) creeper gears. Utility-weight 60-hp model is also best in its class, with 10 speeds including creepers. And big 135 and 190-hp POWER-*Flow*® 550 and 660 models with torque converter give you the effective work-power of *infinite* gear ratios to 27.4 mph.

Optional equipment adds utility

Scarifier rips-up old asphalt, hard-packed dirt, roots, and stones. Dozer blade roots-out brush, pushes debris off right-of-way, backfills around culverts, cleans-up spillage in yards. Snow plow and wing clear heavy snow.

Ask us for complete information.

Slopes banks up to 90°

An L-W Adams grader is handy for erosion control along right-of-way slopes, or building new embankments. Blade shifts out and up to grade banks at any angle to 90° vertical, reaching 12½' high. On the level, blade reach is approximately 7½' beyond wheels.

†Trademark G-1886-RR-2/3

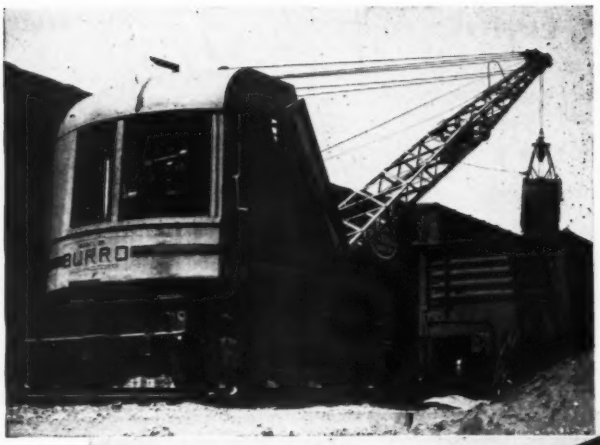
LETOURNEAU-WESTINGHOUSE COMPANY
Railroad Sales Division
Peoria, Illinois
A Subsidiary of Westinghouse Air Brake Company
Where quality is a habit

In The Yard... OR On The Line

BURRO

WORK POWER PAYS!

When a BURRO goes to work — in the yard or on the line — it delivers fast, low cost performance. Equipped with bucket, magnet, hook, tongs or dragline bucket, a BURRO is ready and able to do the hundreds of odd jobs railroad work calls for. Fast travel speeds (up to 22 mph.) and heavy draw bar pull enable the BURRO to move itself and a work train or cars to the job in a hurry. Once on the job, a BURRO wastes no time getting the work done. BURRO's work power pays dividends every day it operates.



Write for illustrated BURRO Catalogs

CULLEN-FRIESTEDT CO.
1301 S. Kilbourn Ave., Chicago 23, Ill.

REDUCE INVENTORIES By Use of Q and C Derails

Q and C Hand Throw Derails are of simple design, durable and effective. They may be adjusted in the brackets to fit a range of rail sections, eliminating the necessity of carrying many sizes in stock, thus reducing inventories.

We also manufacture Sliding Type and Portable Derails, likewise adjustable for many sizes of rails.

Specify Q and C Derails to insure safety and economy.

THE Q AND C CO.

59 E. Van Buren St. Chicago 5 | 90 West St. New York 6 | 611 Olive St.. St. Louis 1

Keep Cool, mister! with ARCTIC BOY

portable water coolers

- Rugged Construction . . . good everywhere men work!
- Galvanized inset, hot dipped *after* forming for flaw-free finish!
- Large top opening, easy to ice, fill and clean.
- Send for complete information and booklet "Care and Use of Your Cooler." Write Dept. C-74.

QUALITY HEAVY METAL WARE
DeLuxe
SCHLUETER MFG. CO. ST. LOUIS, MO.

THE SCHLUETER MFG. CO. • ST. LOUIS 7, MO.

Association News (Cont'd)

Metropolitan Maintenance of Way Club

The annual outing will be held at the Wayne Country Club, near Preakness, N. J., on June 3. There will be the usual program of activities, including golf, baseball, horseshoes and quoits, followed by a buffet luncheon about 1:30 p.m. There will be prizes for all those in attendance, and special prizes for winners of sports events.

Supply Trade News

AEROQUIP CORPORATION — William F. Rogge has been appointed general manager of the Industrial division of this company. He will have responsibility for the Industrial division's manufacturing plant in Van Wert, Ohio, and the Industrial Sales division, with headquarters at the company's general offices in Jackson, Mich. **Ted Mosher** has been appointed industrial sales manager for Aeroquip's Western division, with headquarters at Burbank, Cal.

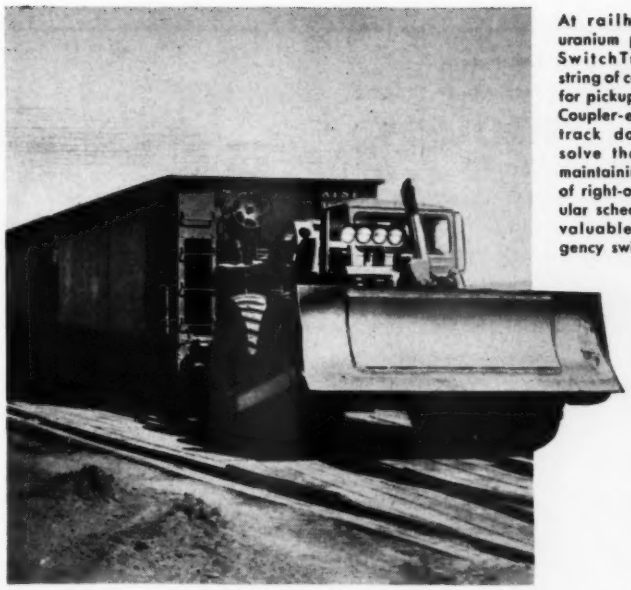
ALLIS-CHALMERS MANUFACTURING COMPANY—T. L. Mellish, has been appointed manager, parts sales, for this company's Construction Machinery division. He had been assistant manager since February 1956.

AMERICAN CREOSOTING—Robert E. Noland has been appointed sales representative in Ohio for this company, a subsidiary of **Union Bag—Camp Paper Corporation.**

MOTOROLA — Harry Ronan has been named to the new position of manager, two-way radio sales, for **Motorola Communications and Electronics, Inc.,** a wholly owned subsidiary of **Motorola, Inc.** Mr. Ronan will have jurisdiction over a 15-state eastern area. **Ed Vogel** has been appointed New England regional sales manager to succeed Mr. Ronan.

LE ROI—This division of **Westinghouse Air Brake Company** has announced the sale of the assets of its engine business to Waukesha Motor Company, Waukesha, Wis. Commenting on the transaction, **Frank Zielsdorf,** general manager of the LeRoi division, stated that "the removal of this engine line will permit the division to concentrate its efforts on the air compressor and tool business and to obtain a greater share of the markets for this type of equipment."

PACIFIC COAST BORAX COMPANY—This company, a division of **United State Borax and Chemical Corporation,** Los Angeles, Cal., has acquired a plant site at Ft. Worth, Tex. on the Ft. Worth Belt. It will start construction immediately of a liquid herbicide mixing plant, for use in mixing liquid killers for the railroads.



At railhead of large uranium plant, versatile SwitchTractor shunts string of cars into position for pickup by locomotive. Coupler-equipped, off-track dozer can help solve the problem of maintaining many miles of right-of-way on a regular schedule . . . prove a valuable aid in emergency switch work.

Simplify R/W maintenance...

Assign scattered earthmoving to mobile dozer-switcher

Since the first L-W Tournatractor® was marketed in 1946, railroads have come to know this LeTourneau-Westinghouse unit well. The 210-hp, 17-mph, rubber-tired dozer has efficiently handled a lot of right-of-way and yard maintenance for major lines. To multiply its RR usefulness, Tournatractor is now available with a standard rail coupler on the rear. This special model, the *SwitchTractor*†, is designed to serve railroads with even greater efficiency.

Takes shortest route to work

With bulldozer or Angledozer®, SwitchTractor can range your tracks from section to section . . . grading, ditching, backfilling. Versatile M/W machine speeds direct to work via shortest route — using right-of-way, roads, or fields as travel routes.

This off-track mobility means dollars-and-cents savings to you. Because 210-hp SwitchTractor has: a) the *speed* for fast job-to-job travel; and b) the *power* for heavy work, it can handle emergency maintenance at a saving in time and money. One rubber-tired machine, with one operator, can often handle emergency repairs normally assigned to an entire work train and crew.

Get facts on versatile M/W tool

For information on this work-proved maintenance-of-way worker, call or write. Find out how the SwitchTractor with AAR coupler can help solve the problem of cutting costs on your hit-and-run railway maintenance and emergency car-switching operations. Get the facts.

Emergency Switcher

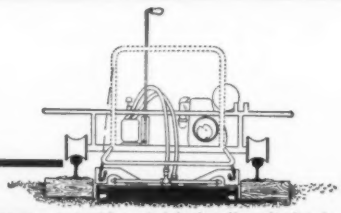
When emergency car-spotting is needed anywhere in your yards, this powerful off-track switcher can save you time, and SwitchTractor's rear-mounted standard AAR coupler clamps securely to string of cars . . . big tires grip ballast and tie-ends for maximum traction. In actual tests, this rubber-tired unit has proved that it can move 1,000,000 lbs of rolling freight up a 1% grade. Coupling and uncoupling take but a few seconds. Worth its weight in gold for emergency car-spotting, when no locomotive is near! †Trademark ST-1833-RR-2/3

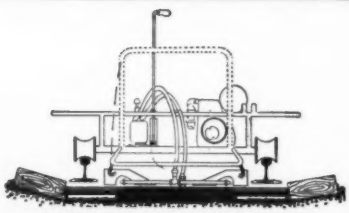
LETOURNEAU-WESTINGHOUSE COMPANY
Railroad Sales Division
Peoria, Illinois
A Subsidiary of Westinghouse Air Brake Company
Where quality is a habit

RAIL PROGRESS MEMBER

NO MORE TRENCHING!
NO MORE JACKING UP TRACK!

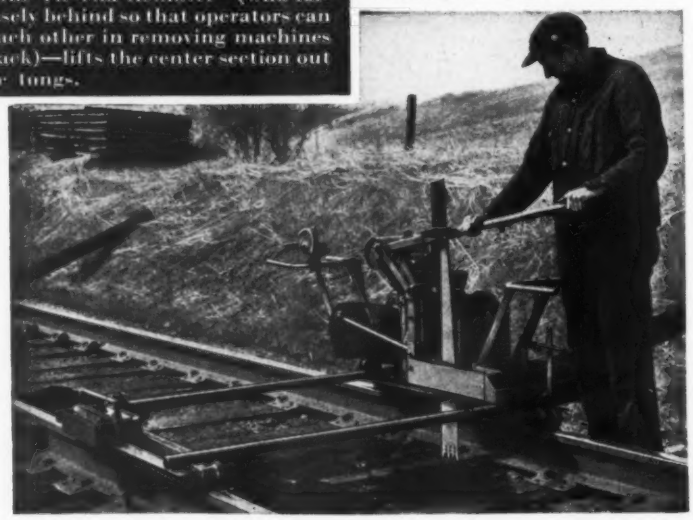
This **WOOLERY**
TIE-REMOVING TEAM
NOW ELIMINATES SLOW,
COSTLY METHOD





A double-ended hydraulic cylinder is then lowered into the tie bed. A simple turn of the valve moves these two pistons outward, *pushing the tie-ends completely clear of the rail—whether working with single or double shoulder tie plates!* The crib is now open—and only the necessary amount of ballast is removed to admit the new tie.

After the tie has been cut on both sides by the WOOLERY Tie Cutter, the operator of the Tie-end Remover—(who follows closely behind so that operators can assist each other in removing machines from track)—lifts the center section out with tie tongs.



Use the WOOLERY TIE-END REMOVER in conjunction with the improved model NU WOOLERY TIE CUTTER! It's the *perfect team* for greater savings on tie renewals—and gives *smoother, safer track, too!*

For highest efficiency two Tie Cutters should be used ahead of one Tie End Remover.

The trend toward heavier rail and double shoulder tie plates has made removing tie-ends increasingly difficult. With the WOOLERY Tie-end Remover, this task can now be done *in less than a minute by one man with no more effort than that required to turn a valve!*

WOOLERY
MACHINE COMPANY
2919 Como Ave. S. E., Minneapolis 14

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Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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THE HARD WORK